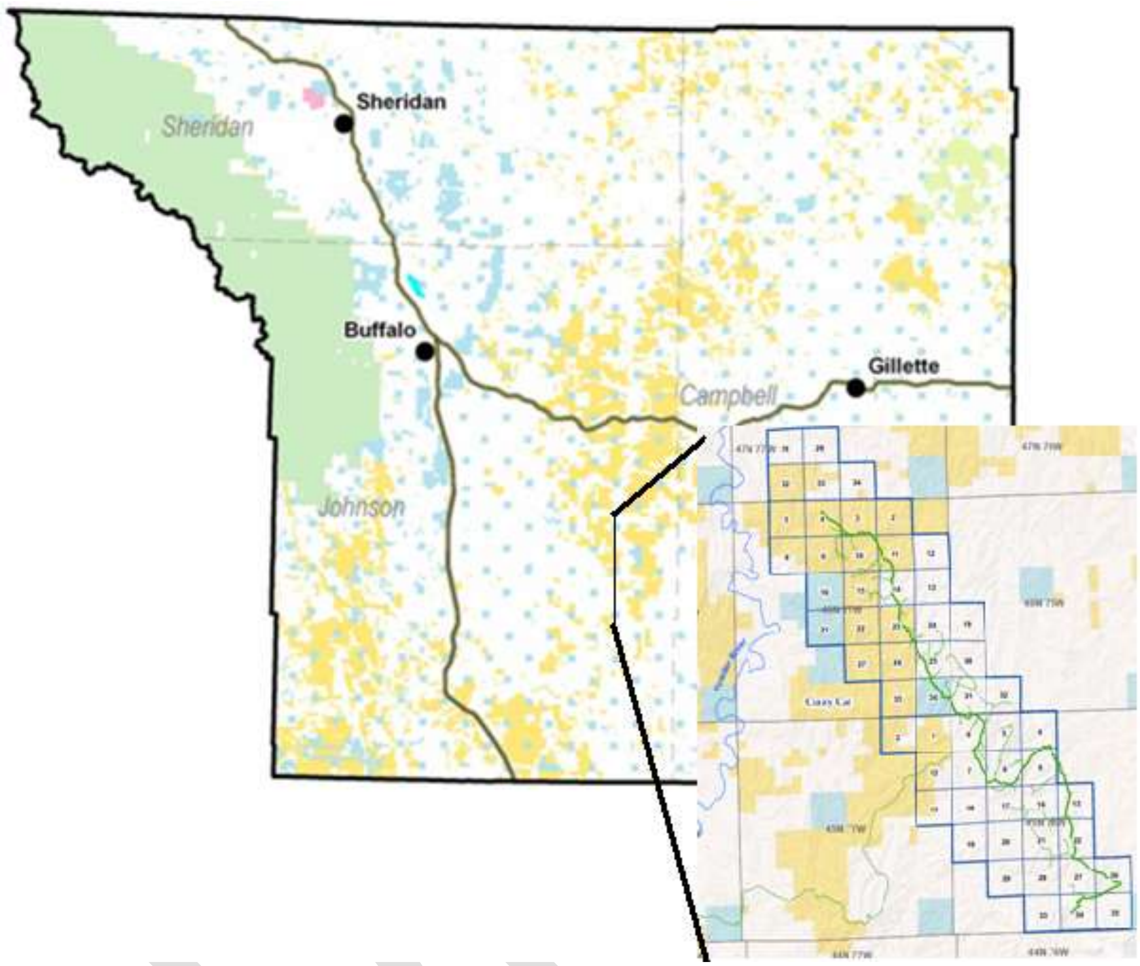
United States Department of the Interior
Bureau of Land Management, Buffalo Field Office, Wyoming
Environmental Assessment WY- 070-EA13-028

Crazy Cat East Oil and Gas Project



The BLM Buffalo Field Office administrative area is in north-central and northeastern Wyoming.

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BLM

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Acronyms and Abbreviations

AADT	annual average daily traffic
ACM	applicant committed measures
AJE	annual job equivalent
APC	Anadarko Petroleum Corporation
APD	application for permit to drill
AUM	animal unit month
bbl	barrel
BFO	Buffalo Field Office
BLM	Bureau of Land Management
Btu	British thermal unit
CAA	Clean Air Act
CBNG	coalbed natural gas
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CO	carbon monoxide
CO_2	carbon dioxide
COA	condition of approval
CR	case recordation
CWA	Clean Water Act
DOT	Department of Transportation
EA	environmental assessment
ECR	environmental condition report
EFM	electronic flow measurement
EIS	environmental impact statement
EO	executive order
EPA	Environmental Protection Agency
ESA	Endangered Species Act
FEIS	final environmental impact statement
FEMA	Federal Emergency Management Agency
FERC	Federal Energy Regulatory Commission
FLPMA	Federal Land Policy and Management Act
FONSI	finding of no significant impact
GSG	Greater Sage-Grouse
ID	interdisciplinary
LACT	lease automatic custody transfer
LCGP	large construction general permit
LR2000	legacy rehost system
LRP	limited reclamation potential
MBTA	Migratory Bird Treaty Act
MC	mining claim
MLA	Mineral Leasing Act
MOU	memorandum of understanding
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NO_x	nitrogen oxides
NRCS	National Resources Conservation Service
NSO	no-surface occupancy
NWI	National Wetlands Inventory Database
OSHA	Occupational Safety and Health Administration
PM	particulate matter
POD	plan of development
PRB	Powder River Basin
PRECorp	Powder River Energy Corporation
PYFC	potential fossil yield classification
RMP	resource management plan
ROD	record of decision
ROW	rights-of-way
SAR	sodium absorption ratio
SHPO	state historic preservation office
SPCC	spill prevention, control, and countermeasure
SSS	special status (sensitive) species
SSURGO	soil survey geographic
TCP	traditional cultural property
TDS	total dissolved solids
U.S.	United States
USACE	U.S. Army Corps of Engineers
USC	United States Code
USDI	U.S. Department of the Interior
USEPA	U.S. Environmental Protection Agency
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
ULT	Ute Ladies' Tresses Orchid
VOC	volatile organic compound
VRM	visual resource management
WARMS	Wyoming Air Resource Monitoring System
WGFD	Wyoming Game and Fish Department
WOGCC	WY Oil and Gas Conservation Commission
WSEO	Wyoming State Engineers Office
WTG	wind turbine generator
WYDEQ	WY Department of Environmental Quality
WYDES	WY Pollutant Discharge Elimination System
WYDOT	WY Department of Transportation

1. INTRODUCTION AND NEED FOR PROPOSAL

1.1. Introduction

Anadarko Petroleum Company (APC) notified the Buffalo Field Office (BFO), Bureau of Land Management (BLM) of their desire to further develop oil and natural gas resources in an area of approximately 36,099 acres in Johnson and Campbell Counties, Wyoming (see Map 1). The proposal includes the drilling of about 36 new oil and gas wells using horizontal drilling techniques - to be drilled from 24 new well pads, more or less. APC will design about 10 of the 24 well pads proposed to accommodate multiple wells per pad. The target zones for the proposal include the Mowry, Niobrara, Frontier, Sussex, and Shannon formations. The proposal would also include, but are not limited to, the installation of the equipment to facilitate mineral production should wells be commercially productive.

BLM analyzed the potential impacts of the APC oil and gas well drilling project in the Crazy Cat East Project Area (hereafter, referred to as the project area, proposal, or CCE) through this environmental assessment (EA), and support future oil and gas applications for permit to drill (APDs). The EA is a programmatic level analysis of potential impacts that may result from the implementation of the proposal or no action alternative. BLM uses a programmatic level review for the consideration of a broad action, such as the implementation of a plan or program (40 CFR 1502.4(b)) and is a beneficial tool for integrating environmental considerations into project planning for actions that occur in a common geographic location, have common project elements, and/or stages of development. Given the large area under consideration and potential impacts associated with well pad development and associated infrastructure, the BLM is using the NEPA process to evaluate a conceptual development plan that assists with analyzing subsequent site-specific APDs. BLM addresses additional project approvals in Section 1.4.

On April 27, 2012, APC approached the BLM regarding the potential to create a programmatic EA for the development of the project area. APC agreed to produce an environmental conditions report (ECR) that could inform the BLM's development of that EA. The following meetings occurred between the BFO and APC in support of the ECR development:

- June 13, 2012: Meeting between APC and BFO staff discussing issues to consider in the ECR.
- August 2, 2012: Meeting between APC and the BFO staff to review the content of the ECR.
- September 6, 2012: Meeting between APC and the BFO staff to review the content of the ECR.

This EA tiers to the Final Environmental Impact Statement and Proposed Plan Amendment for the Powder River Basin Oil and Gas Project (PRB FEIS), WY-070-02-065, 2003 and the PRB FEIS Record of Decision (ROD) pursuant to 40 CFR 1508.28 and 1502.21. Both documents are available on the BLM BFO website (http://www.blm.gov/wy/st/en/field_offices/Buffalo.html). The PRB FEIS analysis document described the full suite of resources and resource use in Wyoming's PRB area, and analyzed the potential effects to these resource and resource use from the development of oil and gas resources. References to specific information from the PRB FEIS used in this analysis are provided in text. The PRB FEIS ROD approves the proposed amendments to the Buffalo and Platte River Resource Management Plans that were analyzed in the PRB FEIS. APC's proposal involves oil and gas development in the PRB, making the information, analyses, and decisions in those documents relevant.

1.2. Need for the Proposed Project

The BLM's need for the action is how to support the goals of the Buffalo RMP and its 2003 Amendment to development an oil and gas lease through APDs on federal land under the Mineral Leasing Act (MLA), Onshore Order No. 1, the Federal Land Policy and Management Act (FLPMA), and other laws while complying with the BLM's regulatory and RMP mandates of multiple-use and natural resource conservation and support of conditional leasehold rights.

1.3. Decisions to be Made

The BLM will decide whether or not to approve the proposed development, and if so, under what terms and conditions to support the Bureau's multiple use mandate, environmental protection, and RMP.

1.4. Scoping and Issues

BLM reviewed APC's proposal to assess the type and magnitude of potential impacts to resources and resource uses. This proposal focuses on the horizontal drilling of 36 new wells, more or less, from 24 well pads, more or less, and development of infrastructure in support of commercially viable well locations. This is an area analysis. Precise project proposals require later site-specific analysis for the BLM cannot analyze unsubmitted and undetermined site-specific proposals. Previously the BFO conducted extensive external scoping for the PRB FEIS, p. 2-1, and on p. 15 of the PRB ROD. This proposal is similar in scope to other fluid mineral development the BFO analyzed. External scoping is unlikely to identify new issues, as verified with recent fluid mineral EAs BLM recently externally scoped. External scoping of the horizontal drilling in Samson Resources EA, WY-060-EA11-181, 2011, in the PRB received 2 comments, revealing no new issues. External scoping in 2010 and 2011 for a proposed RMP amendment revealed no new issues outside of geographically-specific ones. The BLM released this EA and unsigned FONSI for public comment from December 21, 2012 through January 25, 2013.

The BLM BFO Interdisciplinary (ID) Team conducted internal scoping by reviewing the proposal and project location to identify potentially significantly affected resources and land uses (see Table C-1, Appendix C and administrative record (AR). Resources identified as issues of potential significant concern for BLM-administered surface and minerals in the CCE area are described in Section 3, Affected Environment, and carried forward for analysis in Section 4, Environmental Effects. Resources identified as present, but minimally affected are only addressed in Section 3. This EA will not discuss resources and land uses that are either not present, not potentially significantly affected, or that the PRB FEIS adequately addressed. The proposal area clearly lacks wilderness characteristics as it is amidst mineral developments, see Map 4. The following resources are not present, or minimally so in the project area:

- Areas of Critical Environmental Concern and other Special Designations
- Cave and Karst Resources
- Environmental Justice
- Forest Products
- Geological Resources
- Floodplains
- Mineral Resources: Leasable-Coal and Salable Minerals
- Prime and Unique Farmlands
- Wilderness Characteristics
- Wildland Urban Interface

2. PROPOSAL AND ALTERNATIVE

This EA analyzes 2 alternatives, a no action alternative (Alternative A) and APC's proposed action alternative (Alternative B) (proposal).

2.1. Alternative A – No Action

The PRB FEIS considered a no action alternative (pp. 2-54 to 2-62). The BLM keeps the no action alternative current using the aggregated effects approach - incorporating by reference the circumstances and developments approved by the subsequent NEPA analyses for adjacent and intermingled developments to the proposal area. See Appendix C, p. C-2. The no action alternative would consist of not approving this conceptual project proposal. Limitations on the no action alternative are: 1) it has no effect on the presently producing or present approved developments in the CCE area; and 2) it has no prospective effect on analyses or determinations of future site-specific management analyses or decisions in the CCE area.

2.2. Alternative B – Proposed Action (Proposal)

Overview: Anadarko Petroleum Corporation's (APC's) Crazy Cat East (CCE) proposal is the concept of building about 36 horizontal oil or gas wells on 24 new well pads, more or less, within a 36,099-acre project area and associated facilities in Johnson and Campbell Counties, Wyoming. The project area is 16 miles from Sussex, Wyoming, 18 miles from Linch, Wyoming, and 36 miles from Buffalo, Wyoming in Township 45 North, Ranges 76 and 77 West, Township 46 North, Ranges 76 and 77 West, Township 47 North, Range 77 West and encompasses approximately 56 sections (see Map 1). Ten, more or less, of the 24 well pads proposed would be designed to accommodate multiple (2 to 4) wells per pad, resulting in 36 additional wells, more or less, drilled in the overall project area. The target zones for the proposed action include the Mowry, Niobrara, Frontier, Sussex, and Shannon formations. However, the proposal is exploratory in nature, and additional formations with the potential for commercial oil/gas production may be considered once drilling begins. Given the economic risks inherent in the drilling of exploratory wells, which other operators may be reluctant to share, APC has no intent to unitize its leases outside of the existing Culp Draw Federal Unit. APC anticipates the life of each productive well is up to 40 years. The proposal area is clearly lacking wilderness characteristics as it has no federal surface area of 5,000 or more contiguous acres and has existing oil and gas development, roads, and its infrastructure.

The specific site of individual well pads is presently unknown. However, wells would typically be on the perimeter of a 640-acre section to allow for optimal development and drainage, and to conserve space for future mineral exploration in the section. APC would drill 1 to 4 wellbores per 640-acre section. The standard spacing for horizontal wells in the State of Wyoming is one well per 640 acres. However, where applicable, APC would file an application with the Wyoming Oil and Gas Conservation Commission (WOGCC) for approval to revise the spacing. If deemed appropriate from resource conservation and reservoir engineering standpoints, the revised drilling and spacing units would allow for increased well densities in specified areas. The specific well pad and drilling locations would vary in each section based on geologic and surface characteristics and constraints, as well as the properties of the drilled formation.

Wellbores would be spaced 150 feet apart for individual completions on the same pad, and 30 feet for back-to-back completions on the same pad. Wellbore spacing is reduced for back-to-back completions so that the fully-assembled drill rig can simply skid to the next wellbore rather than being disassembled for transport and reassembled at the next surface hole location. Individual wells are spaced 150 feet apart as a safety measure to allow ample space for the rig to operate while having a producing well on the same pad. APC would minimize surface disturbance by using 30-foot spacing where practicable. The likelihood that APC could drill multiple wells with the same drilling rig back-to-back would increase as wells are drilled in the field and additional reservoir data is gathered during the exploratory phase of the proposal. However, until APC acquired sufficient reservoir information to determine the economic feasibility of further development and the most efficient way to recover the oil and gas reserves, APC anticipates a 6 to 12 month delay between the drilling of each successive well on multi-well pads.

All APC's project area wells would comply with well spacing requirements, as prescribed by the WOGCC (WOGCC 3), and be outside of environmentally-constrained areas (i.e., areas designated by the BLM as allowing no-surface occupancy [NSO] due to environmental concerns). APC would conduct all lease operations in full compliance with all applicable laws, regulations (43 CFR 2800, 3100, et al.), *Onshore Oil and Gas Orders,* the approved plan of operations, and Notices to Lessees.

Surface Owners

BLM summarized the general CCE landownership in Table 2.1, below. The BLM's 11,408 surface acres are contiguous in the CCE boundary. These 11,408 BLM acres are contiguous with more BLM acres that together comprise a 20,665 acre BLM parcel in and outside the CCE boundary; see Map 1.

Table 2-1. Summarized Landownership in the Crazy Cat East Area

Landownership	Surface Acreage	Mineral Estate Acreage
BLM	11,408	22,071
State of Wyoming	1,924	633
Private Landowner	22,767	11,409
BLM 2012b		

Drilling and Completion Well Pads

APC's anticipated initial drilling and completion pad size would range from 8 to 14 acres, with an average size of 12 acres. Individual pad size would vary based on the number of wells per pad and constraints related to lease/landowner agreements, operational safety, and topography. The horizontal drilling techniques used to drill the 36 more or less, proposed horizontal wells in the project area would require larger pad sizes than analyzed in the PRB FEIS, which estimated that approximately 5.5 acres of short-term surface disturbance would be required for the construction of well pads and associated improved access roads for a conventional vertical oil and gas well, p. 4-312. Although the requested average pad size of 12 acres is larger than this estimate, aggregate surface disturbance in the project area would be reduced through the use of multi-well pads and the use of long, horizontal wellbores that could access resources that would otherwise require multiple 5.5 acre well pads for conventional vertical oil wells; see Table 2-7 for additional information. On a per well basis, disturbance in the project area would average only 8 acres per well. Consolidating drilling and production operations for multiple horizontal wells onto a single pad would reduce the aggregate surface disturbance in the project area because the per-well incremental disturbance is less than would occur with the construction of an additional pad. As the proponent gains additional reservoir data, industry practice shows their ability to complete wells back-to-back is likely to further decrease the area of surface disturbance needed for each well.

Construction of all 24, more or less, well pads would result in approximately 288 acres of additional surface disturbance in the overall project area; see Table 2-2. APC would attempt to limit surface disturbances from well pads in certain circumstances (including, but not limited to, areas of extensive cuts and/or fills, proximity to ephemeral drainages, etc.), but such determination would be made during on-site inspections. See Table 2-2 for a comparison of the proposed action with a hypothetical re-design of the proposed action using single well-per-pad vertical wells. In addition Figure 2-1 and Figure 2-2 graphically show how facilities and wells under the proposal would compare to those in hypothetical re-design of the proposed action using single well-per-pad vertical wells, Figure 2-2.

Table 2-2. Comparison of the Proposal Versus Development Using Single, Vertical Wells

	Hypothetical Vertical Well Alternative[1]	Proposed Action
Type of development	Single vertical well, well pads	Mix of single and multiple horizontal well, well pads (the proposed action)
Well surface spacing	40 acre-spacing (16 wells / 640-acre section)	One to three wellbores / 640-acre section
Well pad size	5-acre surface well pads[2]	12-acre surface well pads (8 acre pad and 4 acres cut/fill)
Number of wells/well pads	896 wells/well pads	36 wells/24 well pads
Initial surface disturbance[3]	4,480 acres	288 acres
Post interim reclamation surface disturbance[3]	3,674 acres (4.1 acres per pad)[2]	72 acres (3 acres per pad)

[1] The hypothetical alternative using vertical wells above, is based on the an alternative from the *Greater Natural Buttes Final Environmental Impact Statement* (BLM 2012c). That alternative proposal's spacing was listed as a range from 40 acres to 20 acres; the 40 acre spacing shown in this table would result in the least surface disturbance of that range of potential spacing.

[2] The average well pad sizes shown are from the PRB FEIS for typical deep oil wells.

[3] Surface disturbance estimates are for well pads only, and do not include associated roads and facilities.

Figure 2-1. 80-acre Spacing Coalbed Natural Gas (CBNG) Well & New Horizontal Well Initial Disturbance

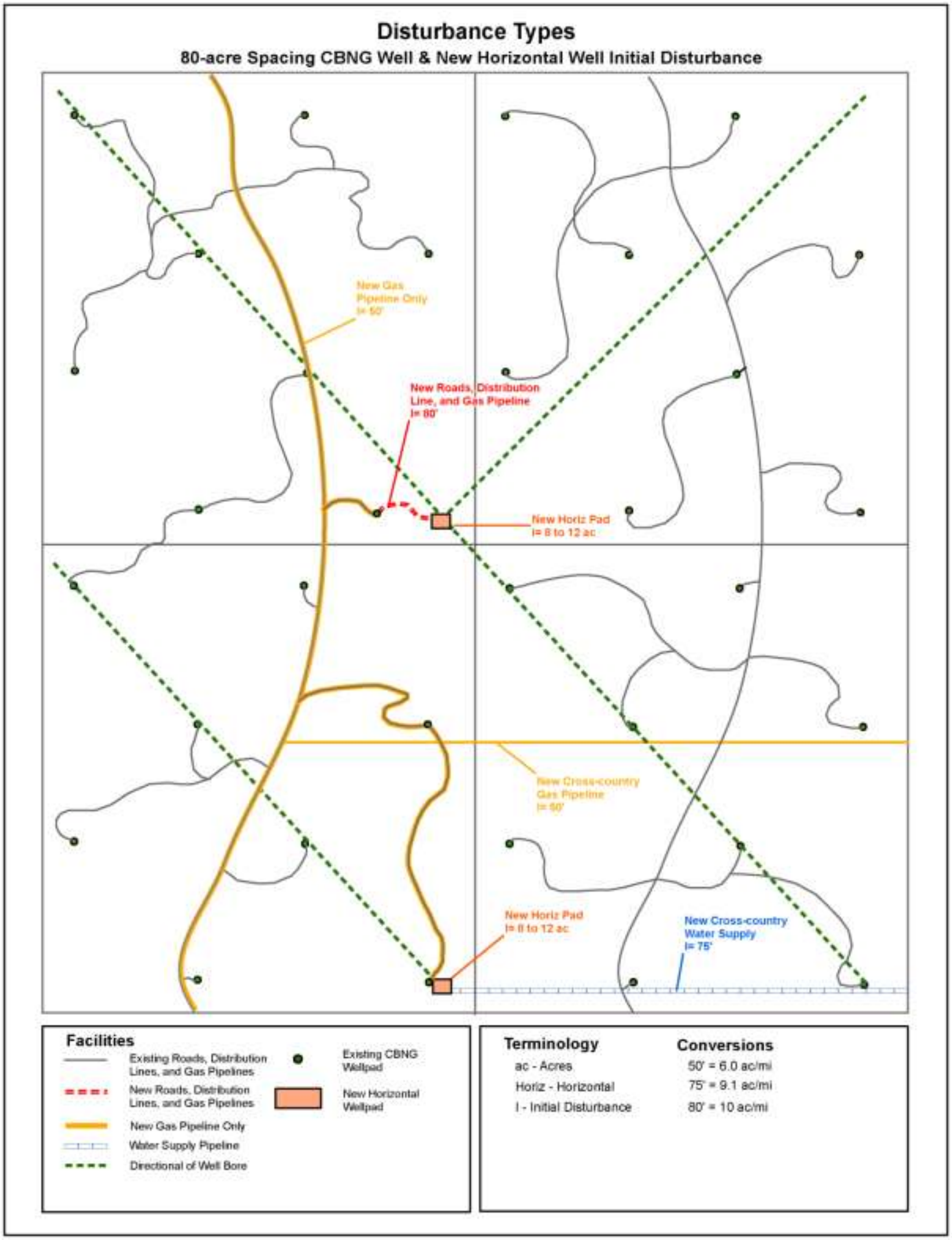
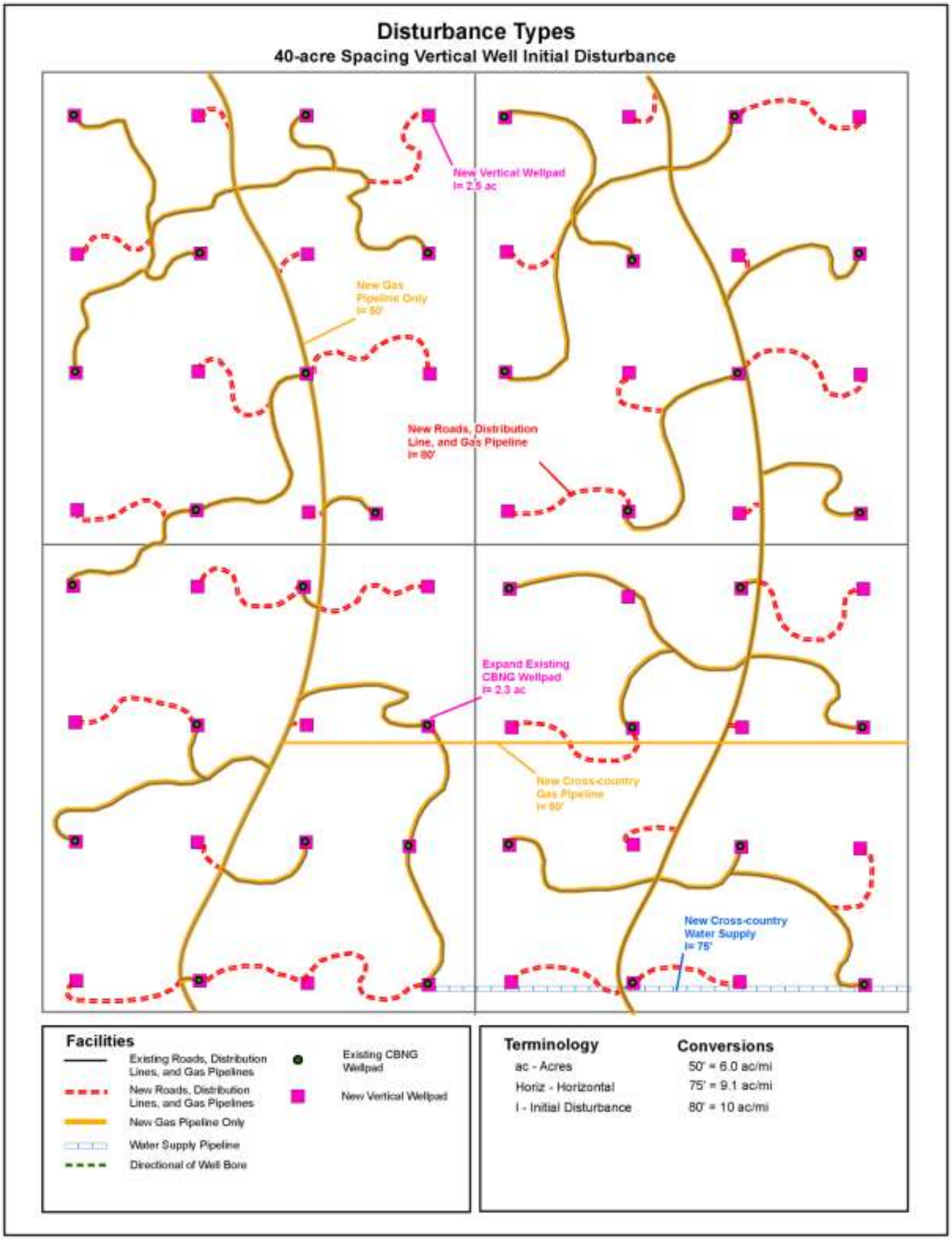


Figure 2-2. 40-acre Spacing Vertical Well Initial Disturbance



APC bases the anticipated drilling and completion well pad size on several factors. First, multi-stage horizontal completions require all equipment and materials to be on location prior to beginning operations, thus increasing the overall pad size needed to accommodate these items. Second, APC ensures operational safety necessary due to the scope of activity and equipment used, requiring sufficient space and secure facility placement. APC safety setbacks require that the wells and rigs be entirely on the cut portion of the pad and that equipment be placed certain distances apart (see Figure 2-5 for general equipment setback recommendations and Figure 2-4 illustrating a production equipment layout with safety setbacks). Furthermore, on multi-well pads, wellbores would be spaced 150 feet apart for individual completions, and 30 feet for back-to-back completions. As discussed previously, wellbore spacing is reduced for back-to-back completions so that the fully-assembled drill rig can simply skid to the next wellbore rather than being disassembled for transport and reassembled at the next surface hole location. APC's ability to perform back-to-back completions is expected to improve as additional knowledge of formation productivity and optimum drilling techniques are gathered through the drilling of each successive well, potentially allowing APC to reduce average per-pad surface disturbances from 12 acres to approximately 8 acres in the later phases of the project.

Figure 2-3. General Recommendations for Equipment Spacing

MINIMUM DISTANCE IN FEET	Fired Vessels [4]	Pressure Vessels	Storage	Load Connections	Compressors	Engines	Motors [3]	Oil & Gas Wells	Electrical Controls [3]	Flares
Fired Vessels [4]	20 [6]	50	150	15	150	25		150 [5]		20
Pressure Vessels	50	—	50	50	25 [2]	25 [2]		100	25	150
Storage	150	50	—	100	100	100 [1]	100 [1]	150	100	150
Load Connections	150	50	100	—	75	25		150	25	180
Compressors	100	25 [2]	100	75	—			100	25	150
Engines	25	25 [2]	100 [1]	25		—				150
Motors [3]			100 [1]				—			150
Oil & Gas Wells	150 [5]	100	150	150	100			—	100 [7]	150
Electrical Controls [3]		25	100	25	25			100 [7]	—	
Flares	150	150	150	150	150	150	150	150		—

Notes: 1. A circulating pump engine or motor or a vapor recovery system may be located 50 ft. from storage or 10 ft. outside the firewall, whichever is greater.
2. Scrubbers may be located near the compressor and its driver.
3. Electric motors and controls shall meet or exceed the requirements for an area electrical classification per API RP500 and NFPA 70.
4. Stabilizers with heating equipment, glycol absorbers and reconcentrators, and packaged heater and separator may be considered as a single fired vessel and spaced accordingly.
5. A fired vessel may be located as close as 100 ft. to a well if equipped with a flame arrestor.
6. Indirect heaters and heaters for non-flammable substances may be grouped at a closer spacing.
7. The spacing between Wells and Electrical Controls may be reduced to 25 ft. if operationally necessary. If necessary, the Controls should be a minimum of 4 ft. above grade.

Drilling, Construction, and Production Design Features

For the proposed action, APC expects to:

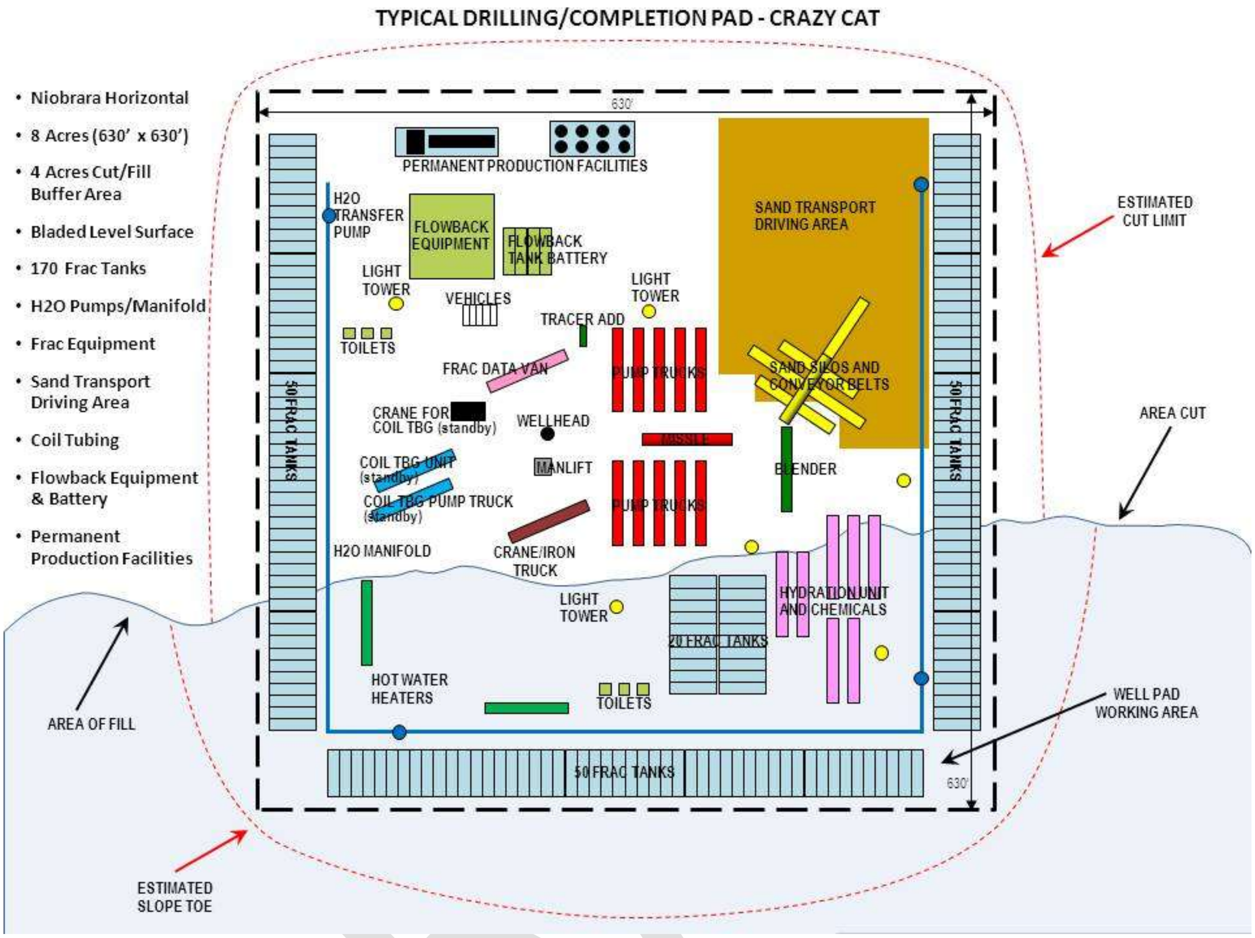
- Drill and construct an estimated 12 to 18 wells per year, completing all proposed wells in 3 to 4 years assuming that APC performs drilling and completion operations year-round with 1 dedicated rig. Rig availability, limitations on completion resources, timing restrictions, weather, personnel, and internal resource limitations are examples of factors that may extend the timing for completion of the proposed wells. Drilling and construction is year-round in the region. Weather-related delays may occur, but rarely last multiple weeks. Timing limitations in the form of conditions of approval (COAs) and/or agreements with surface owners may impose temporal restrictions.

- Develop a road network consisting of existing, improved, and new proposed roads. APC would use the existing backbone road through the project area (see Map 1), with upgrades to existing roads (where practicable) or new roads as needed to access individual well pads.
- Use an existing above ground power line network to the extent practicable, with new overhead power lines and buried electrical lines to each well pad.
- Explore options for a centralized water supply system with temporary above ground pipeline to well sites (full field development).
- Install a natural gas transport and compression system consisting of new buried gas gathering pipelines and a centralized compression station.
- Locate power lines and pipelines in or immediately adjacent to new roadway disturbance or adjacent to existing roadways where practicable.
- All engines will maintain a decibel level below 70 decibels as measured at the well pad boundary.
- For a summary of vehicle trips per well, see Table 2-6.
  The design features listed below are intended to summarize the "typical" drilling and completion well pad for the Crazy Cat East Project:
- A closed-loop drilling mud system.
- Water tanks for use in hydraulic fracturing consisting of either 175 – 500 bbl tanks (for single completion) or 250 – 500 barrel (bbl) tanks (for back-to-back completions).
- Ten tanks for sand and a sand transport and driving area.
- APC will bury cuttings near each well pad in 1 of 2 fenced cuttings pits containing plastic/vinyl liners.

Individual APDs will be completed prior to any construction for each well; these APDs will contain specific design and construction information for each well pad, explained in well-specific Surface Use Plans. See Figure 2-4 for a graphical representation of a typical drilling and completion pad layout with facilities. The application of new or different facilities may change the typical pad layout shown in Figure 2-4, but APC can not predict whether these alternate facilties would reduce the overall pad size. For example, APC has also employed a larger, bladder tank on the Mojave Fee 4378-18-13H well. This bladder tank is 153 feet in diameter and uses 220 feet of excavation diameter, and consists of 24 steel panels that measure 20 feet wide by 12 feet tall and one liner that measures 190 feet by 190 feet by 38 millimeters. The tank holds 42,000 bbls at 272.88 bbls per inch. While the use of this tank could potentially reduce the pad size, APC's limited history of use and a need to place the tank on the pad's cut portion make it impossible to predict such a reduction before identification of the actual pad locations.

All wellbores would be cased and cemented prior to well completion in accordance with an approved APD package and Onshore Oil and Gas Order No. 2. A typical casing program consists of surface, intermediate, and production casing intervals, with each successive casing run nested in the previous. APC determines casing setting depths by a host of factors, including: presence/absence of hydrocarbons; fracture gradients; usable water zones; formation pressures; lost circulation zones; other minerals; or other unusual characteristics. After installing casing strings, APC would seal the annular space around the outside of a casing string using a specially formulated Portland cement mixture, or other hydraulic cement mixture, to hold the casing in place and prevent any movement of fluid in this annular space. APC will determine specific casing and cementing programs when preparing site-specific APDs.

Figure 2-4. Typical Conceptual Drilling and Completion Pad Layout



Access Roads

The proposed action would use or upgrade the existing road network to the extent practicable, with additional new roads built as needed to access well pads. APC will engineer, upgrade, and build new roads to BLM standards from the BLM Manual 9113. The proposal would require upgrades (i.e., widening) of about 8 miles of well roads in the project area. Upgrades to existing well roads would require an initial disturbance width of approximately 15 feet, more or less, to facilitate the passage of project equipment, disturbing approximately 15 acres, more or less in the project area. Reclamation of these upgraded road segments to their original widths would result in no long-term surface disturbance.

Access to the approximately 24 well pads would require construction of 11 miles, more or less of new access roads. Based on a typical initial disturbance width for new roads of 60 feet, 80 acres of initial disturbance may occur. An average post interim disturbance width of 45 feet would result in approximately 60 acres more or less, of long-term disturbance. Whenever practicable, roads would be designed to disturb less than the 60-foot initial disturbance width, potentially through the incorporation of additional turnouts or other methods, so long as traffic and safety concerns are satisfied. However, in limited circumstances, disturbance widths up to 100 feet may be necessary to meet engineering and safety standards. Existing access roads in the project area would be maintained as necessary to accommodate appropriate year-round traffic and prevent unnecessary erosion by maintaining proper crown and ditching.

APC will base well access road design characteristics based on varied terrain, but would typically be constructed using 6 inches of clay and surfaced with 6 inches of gravel, unless precluded by land conditions or surface owner agreements. The 20-foot wide gravel driving surface would be supported by a 24-foot sub-grade and flanked by 10-foot ditched slopes on one or both sides. The driving surface would have an average increase of 5 to inches above the original surface. Precise road dimensions would be supplied with individual well plats in the site-specific APD. Access roadway would be built to be permanent, and would remain in place for at least the productive life of the wells. Temporary roadways required for the construction of facilities would be reclaimed as soon as practicable.

APC will obtain gravel for the well roads from an area permitted commercial gravel supplier identified at the time of APD submittal. Though the source of gravel for the project is unknown, BLM identified 2 mineral material permit areas near the proposal that could potentially, though not necessarily, serve as gravel sources for the proposal; see Map 2 and Table 2-3. Suppliers will provide erionite-free gravel for use in the project area. APC would not construct new well roads in conjunction with gravel transport.

Table 2-3. Potential Gravel Sources Near the Project Area

Serial Number Source: BLM 2012b.	Legal Location of Mineral Material Permit Area			Permit Expiration Year
	Section	*Township*	*Range*	
WYW 170202	31	46 North	77 West	2016
WYW 170198	3	43 North	79 West	unknown

Power Lines

APC would request that Powder River Energy Corporation (PRECorp) (the owner of the existing distribution lines in the project area)[1] install overhead lines and "drop" power at several locations in the project area. APC would then route power from these drop points (via underground distribution lines) to each individual well location in the project area. Buried lines would follow existing access roads to the extent practicable to minimize new disturbances. All distribution lines installed by APC along access roads would be buried in a trench on the opposite side of the road as buried gas lines, and would require an initial disturbance width of about 20 feet, to be reclaimed after construction is completed. PRECorp will design, construct, and install overhead lines according to standards in the PRECorp *Final Avian Protection Plan,* in order to protect bird species and minimize the possibility of raptor electrocutions in the project area (PRECorp 2010). The PRECorp *Final Avian Protection Plan* is a utility-specific standard created per the *Avian Plan Protection Plan Guidelines* developed jointly by the Avian Power Line Interaction Committee (APLIC) and the U.S. Fish and Wildlife Service (FWS) in 2005 (FWS and APLIC 2005). These guidelines are used in conjunction with *Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006* as a "tool box", whose components could be tailored by individual utilities to address site specific needs (APLIC 2006). The installation of overhead lines would result in an initial disturbance width of approximately 30 feet (18 acres), with subsequent reclamation resulting in a long-term disturbance width of approximately 9 feet (5 acres).

Drilling and Completion Water Sources, Amounts, and Disposal

APC estimates that drilling and completion for each well would require between 80,000 to 100,000 bbls of water. APC assumed for this EA that water for hydraulic fracturing would come from the Table Mountain Load Out facility via an underground water pipeline to a centralized tap in the project area, before being piped or trucked to water tanks at each well pad. APC may also consider the use of make-up water from the Culp Draw and Table Mountain injection systems as drilling and completion water sources. Make-up water is fresh or produced water from another field stored in tanks at the injection facilities and used to supplement water flood injection when the systems do not receive sufficient volumes of produced water from their respective fields. APC would be required to submit new permit

[1] PRECorp owns all existing distribution lines in the project area except for one utility pole owned by APC.

applications in order to use make-up water from these facilities as a drilling and completion source. Water right information associated the with potential drilling and completion water sources is in Table Additional water sources may include water obtained through private transactions. Produced water is likely of limited quantity and would be stored in tanks on site until being hauled to a permitted disposal facility. The volume and quality of produced water is currently unknown; to estimate the volume and quality of produced water, APC would need to produce the horizontal well(s) for a period of time.

Table 2-4. Potential Drilling and Completion Water Sources

Permit Number[1]	Facility Name	Beneficial Uses	Water Well Location				Appropriation Amount	Depth
			Qtr	Sec	Twnp	Rg		
P197222.0W	Table Mountain Load Out	Miscellaneous	NENE	22	45 N	77 W	300 gpm	Source: CBNG wells
P182026.0W	Culp Draw Unit WSW #1	Irrigation; Stock; Miscellaneous	NENE	36	46 N	77 W	130 gpm	7200 ft TD 3920'– 6987' completion
P89826.0W	TMU WSW #1	Industrial	NWSE	35	45 N	77 W	50 gpm	7401 ft TD 6916'–7147' Fox Hills

Source: ICF 2012

[1] Water right information acquired from the Wyoming State Engineer's Office e-Permit database (WSEO 2012).

Completion

Once APC drills and cases a well, it begins completion operations. Completion operations include cleaning out the wellbore, pressure testing the casing, perforating and hydraulic fracturing in the horizontal portion of the hole, and running production tubing for the resultant commercial production.

In conjunction with these completion operations, APC would hydraulically fracture selected intervals in the targeted formation in order to "stimulate" production. These hydraulic fracturing operations would typically consist of pumping a thick fluid mixture, consisting of 99.5% sand (proppant) and water into the down hole under pressure. Chemical additives added to the hydraulic fracturing fluids to improve performance. The mixture is then pumped through the perforations, or ports, into the formation. As the formation is fractured, the resultant fissures (fractures) fill with proppant which props them open and facilitates the flow of oil/gas into the wellbore and subsequently to the surface. For those horizontal wells drilled, APC would conduct these completion operations on the entire length of the lateral (horizontal wellbore) in stages commencing at the terminus of the wellbore (bottom hole location) and working backwards to the beginning of the lateral section. The WOGCC requires operators to disclose the types and amounts of hydraulic fracturing chemicals used prior to stimulation (WOGCC Rules and Regulations, Chapter 3 §45(d)). For additional information on hydraulic fracturing, including a list of APC's hydraulically fractured wells, visit the hydraulic fracturing chemical registry at fracfocus.org.

Based APC's recent experience with the application of horizontal hydraulic fracturing technology to deep formations in the PRB, the estimated length and height of the fractures would be approximately 300 feet in either direction parallel to the dip plane of the formation, 200 feet up dip and 100 feet down dip from the wellbore. These figures represent approximations and could change as more as more information is gathered from the development of these formations using horizontal hydraulic fracturing technology. However, given the distance and geologic separation between the target formation and the aquifers, there would be no communication between the hydraulic fractures and any known aquifers. APC reports that current horizontal hydraulic fracturing applications indicate a need for between10 and 20 stage completion along the horizontal portion of the wellbore.

Upon completion of the hydraulic fracturing operation, the well would be flowed back to the surface through temporary production equipment in an attempt to recover as much of the hydraulic fracturing fluids as practicable, and to clean excess sand out of the lateral prior to setting production equipment on location and commencing production. All fluids returned during the flow-back procedure would be captured in steel tanks situated on the well pad; flowback would occur at a rate of approximately 42 gallons (one bbl) per minute over a period of approximately 20 days. APC will recapture these fluids and transfer them to 500 gallon trucks for off-site transfer and disposal by a professional disposal service in accordance with BLM and WOGCC rules and regulations. All flowback fluids captured after the approximate 20-day period are considered produced water. APC's analysis of flow-back fluids from a horizontal well at the nearby Table Mountain horizontal well (TMFU 4577-23-11H) concluded that approximately 25% of the fluid injected into the well during the hydraulic fracturing process is recovered in this initial 20-day flow-back period. Similar storage and disposal methods are used to process produced water, which may be of limited quantity.

APC is investigating alternatives for recycling and re-use of flowback and produced water through pilot programs in other assets and basins. If technologically and economically viable alternatives emerge, water recycling technologies may be implemented in the project area. Potential recycling options include the use of produced water from both CBNG and deep oil wells as a completion water source for use during hydraulic fracturing, or as a source of make-up water for water injection wells. For example, a recently approved sundry allows APC to inject produced water from nearby well TMFU 4577-23-11H in the Culp Draw or Table Mountain injection systems rather than trucking it to a disposal well or evaporation ponds (WOGCC 2012a). The recycled produced water will help make-up shortfalls for these water injection systems, which currently do not receive sufficient volumes of produced water from their respective fields. Therefore, this reduces a need to augment these water floods with fresh water sources.

Since APC anticipates that produced water from the proposed wells may be of limited quantity, its use would depend on the rate, volume, and quality of water generated. Unless APC seeks and is granted approval to recycle water from the proposed wells, all produced water would be stored in tanks on site until being hauled to a permitted disposal facility. Specific disposal sites will be identified after well completion in accordance with Onshore Oil and Gas Order No. 7.

Although a carbon dioxide (CO_2) pipeline is scheduled for development near the project area, APC does not, presently, anticipate tapping into this pipeline to perform CO_2 injection or "flooding" to increase oil output from the target formations. However, it is possible that reservoir characteristics, as learned from the exploratory phase of development, may suggest a need for CO_2 injection.

Pipelines

Under full field development, APC expects that gas sales from these wells would be accomplished through the installation of a gas gathering system in the project area designed to collect the natural gas produced from each individual well and transport said gas to a main trunk line that would then transport the gas to tie-in points with a third party natural gas distribution line. Due to the exploratory nature of the proposed wells, there is a high level of uncertainty in predicting the expected rate of gas production. If sufficient volumes are present, some of the gas produced may be used to power equipment on the well location, including the heater-treater, pumping unit, and a temporary electrical generator necessary to power the pumping unit and portable lease automatic custody transfer (LACT) unit, which is required by the BLM Authorized Officer for oil measurement and royalty accounting purposes. The remaining gas would be metered on lease for royalty accounting purposes and would then be introduced into the gas gathering system for sales.

Preliminary information on existing pipeline infrastructure suggests that an estimated 20 miles of 4-inch trunk line and 9 miles of 2 to 3-inch lateral pipelines were installed in the project area in the early 1970s; however, the condition of these lines and their suitability for oil or gas gathering services is currently unknown. The existing trunk line could be suitable for oil gathering; however, a central oil gathering system is not included in the proposed action. APC anticipates the gas gathering system for the proposed action would require new infrastructure, including a small (4 acre) compressor station. The compression system that previously served the area is no longer in operation.

New gas gathering pipelines would likely consist of buried 3-inch steel laterals to gather the gas from each individual well location and transport said gas to the main 6-inch trunk line. These gathering lines would be installed in a 50-foot right-of-way (ROW) adjacent to existing roads where practicable (121 acres of initial disturbance), and in a common ROW with new or upgraded roads (no new surface disturbance). Where paralleling an access road is not feasible, cross-country lines would be used to connect with the main trunk line. The construction of an 18-foot ditch to install these cross-country lines would require a disturbed ROW width of 50 feet (27 acres of initial disturbance). All surface disturbances resulting from pipeline installation would be subsequently reclaimed, resulting in no long-term disturbance. Based on expected production rates, APC proposes one compressor station of approximately 800 horsepower in the project area to facilitate the flow of gas from wells to a third party tie-in point.

Though not currently proposed here, additional pipelines could be installed in a similar fashion to gather oil and produced water (depending on the rate and overall volume of their production). In addition to using suitable existing infrastructure, it is possible that these systems could, where practicable, be installed simultaneously with gas lines, thus minimizing additional surface disturbance.

Drilling and Completion Sequence

Based on experience with other horizontal drilling and completion operations, APC anticipates the timing and sequencing shown in Table . These times will vary based on factors at each well location. APC anticipates that drilling and construction will proceed at a rate of 12 to 18 wells per year, with all wells completed within 3 to 4 years.

Table 2-5. Anticipated Drilling and Completion Sequence And Timing (per well)

Drilling and Completion Step	Approximate Duration
Build location (roads, pad, and other initial infrastructure)	30 days
Mob rig	2-4 days[1]
Drilling (24/7)	30 days[2]
Schedule/logistics for completion	30 days
Completion (setup, completion, demobilization)	5-8 days

[1] Depending on distance and need to add supplemental drilling equipment, such as skidding plates.
[2] By comparison, approximately 2 days are required to drill a CBNG well. Source: ICF 2012

Production

Production equipment needed on the well sites would typically include, but is not limited to the following:

- a pumping unit to provide power for each individual well. The make and model of the installed pumping unit will be determined based on availability during the flowback period after the well is completed. Electrically powered Jet Pump (typical dimensions: 30 feet wide x 100 feet long x 8 feet high) and/or Rod Pump (pumpjack) (typical dimensions: 8 feet wide x 49 feet long x 35 feet high) units would typically be used, or in rare instances, a gas-powered artificial lift. The pumping unit will be enclosed with safety guards and meet Occupational Safety and Health Administration (OSHA) requirements;
- a portable LACT unit for each individual well;
- a 6-foot by 20-foot horizontal or vertical heater treater with at least 750,000 British Thermal Unit (Btu) burner per well;
- a 30-inch by 10-foot two-phase vertical separator for each individual well;
- a tank battery, which would generally consist of eight 400 bbl steel oil tanks per well. These tanks would typically all be located together and would be isolated for each particular well with a LACT unit to prevent the commingling of oil produced from each individual well as required by the BLM;

- an oil recirculating pump with an electric motor;
- a 48-inch emission control device for tank VOCs;
- a 4-inch flare stack to temporarily burn produced gas; and,
- a meter utilizing electronic flow measurement (EFM) with automation from a field office for gas sales from each individual wellbore if/where applicable.

All permanent above ground production facilities installed on the producing well site would be painted one of the standard environmental colors recommended by the Rocky Mountain Five-State Interagency Committee to be selected at the BLM's discretion. A dike or berm would be constructed completely around those production facilities designed to hold fluids (e.g., production tanks and heater/treater).

Interim Reclamation

Sufficient topsoil to facilitate revegetation would be segregated from subsoil during construction and stockpiled for future reclamation of the disturbed areas. The salvaged topsoil would be evenly distributed over those disturbed surfaces subject to reclamation upon termination of drilling and completion operations as part of the reclamation and revegetation program. APC will stabilize topsoil stockpiles with vegetation until used for reclamation as necessary or required by either the private surface owner or the BLM. All disturbed surfaces would be reclaimed as soon as practicable after the initial disturbance.

Table 2-6. Vehicle Traffic Estimate for a Typical Well under the Proposed Action

Phase of Development	Average Trips Day/Well[1]	Total Trips/Well
Pre-Construction Activities	19	320
Drilling Activities	44	1,112
Completion Activities	160	1,778
Production and Operation Activities[2]	4	Dependent on life of well

Source: ICF 2012

[1]Represents an average number of vehicle trips for operational support; vehicle traffic estimates do not include rig move in or out.

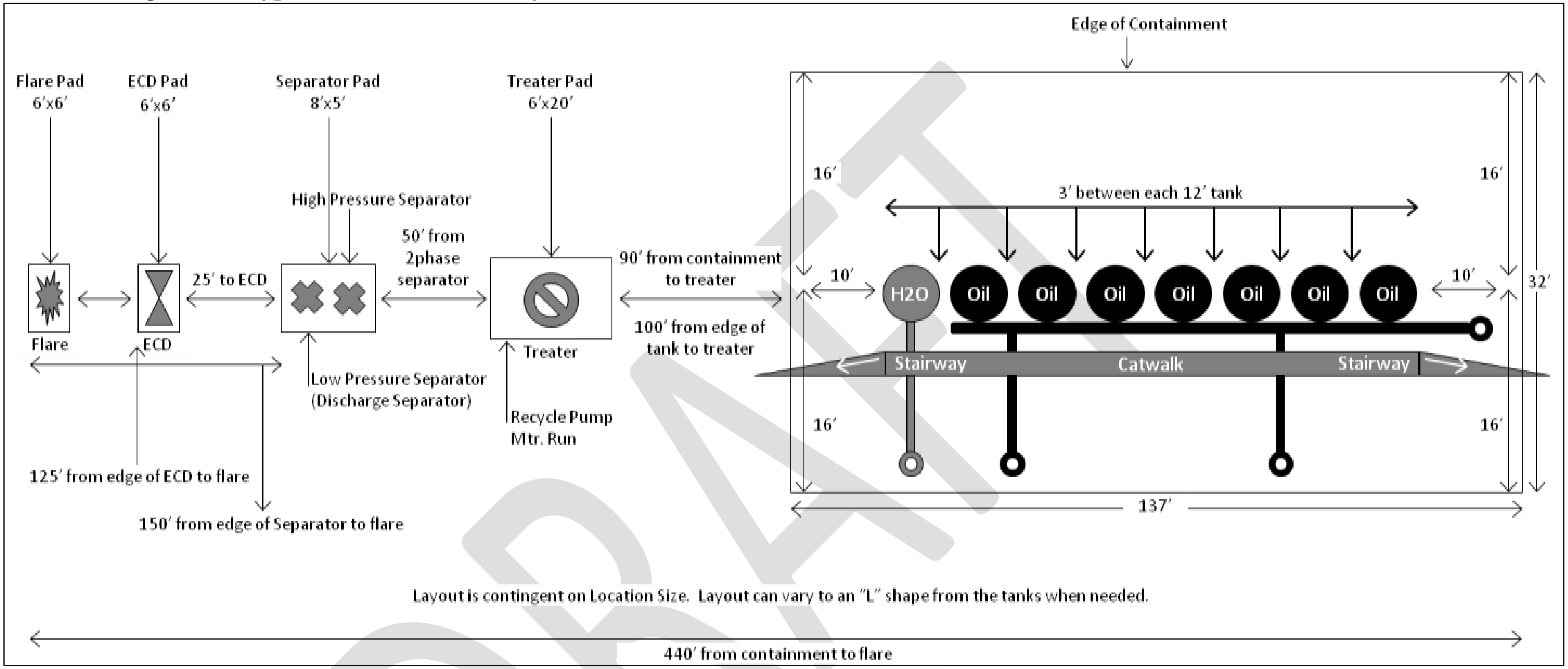
[2] Includes oil transport of 1 to 2 trips per day for the first 3 to 6 months, and 1 trip per day for the remainder of the operational life of the well. Since produced water generated from the proposed wells is anticipated to be minimal, trips associated with produced water disposal or recycling are not included in these estimates. The number of production and operation trips may be reduced for multi-well pads by combining trips.

Approximately 30 percent (2.4 to 3 acres[2]) of the original 8-acre equipment-containing well pad would be required for long-term production operations. The remaining area of the initial well pad disturbance would be reclaimed primarily through backfilling the cuttings pits, leveling, and recontouring of "non-working" disturbed areas, redistribution of stockpiled topsoil over these disturbed areas, installation of erosion control measures, and reseeding as recommended by the BLM and/or private surface owner. Seeding would occur in the next appropriate seeding season following the completion of surface disturbing activities, generally within 180 days of the last well being completed on the pad. In the fall, seeding would take place after September 15th and prior to ground frost, and in the spring after the frost has left the ground and prior to June 1st.

Solidification and subsequent reclamation of the cuttings pits would be accomplished as soon as practicable following well completion. Cuttings pits would be backfilled immediately upon completion of the solidification process. Immediately following road construction, stockpiled topsoil will be evenly redistributed over the road embankment and borrow ditch slopes. These areas will be stabilized and reclaimed with the approved seed mix as soon as practicable in the next appropriate seeding season, as

[2] *Analyses in this document conservatively assume 3 acres of long term well pad disturbance.*

Figure 2-5. Typical Production Pad Layout



discussed above. Pipeline ROW disturbance areas would be completely reseeded as soon as practicable in the next appropriate seeding season in accordance with the seeding recommendations obtained from either the private surface owner or the BLM, as appropriate. Prior to re-seeding, compacted areas will be scarified by ripping or chiseling to loosen compacted soils where underlying material will not significantly degrade topsoil.

Most existing CBNG development is in the northwest corner of the project area, in and around the Kingsbury Unit. The majority of these wells, currently operated primarily by WPX Energy, could remain active for approximately 10 years. While some wells may have shorter lives, they may not be shut-in until the entire area can be plugged and abandoned as a single project. (To see what the project area could look like under the proposed action following final reclamation of the CBNG wells and infrastructure, see Figure 2-6, below). Because APC does not operate these existing wells, the exact timeline and sequence of well plugging and abandonment in the area is unknown. The southeast portion of the project area currently has limited CBNG development, and could remain relatively undeveloped until favorable market conditions return.

Surface Disturbance Summary

The construction activities described in the section above and summarized in Table represent the standard activities the proponent anticipates for the well locations in the project area. Where an area or distance is given, these numbers represent the anticipated average across all well locations, and may therefore vary at individual locations as a result of resource constraints, topography, or engineering factors. Construction activities for each proposed well location and associated infrastructure would follow practices and procedures outlined in subsequent individual APDs and any COAs appended thereto by the BLM. In addition, access road and well pad construction activities for each proposed well location would follow guidelines and standards as set forth in the joint BLM/U.S. Forest Service (USFS) publication: *Surface Operating Standards for Oil and Gas Exploration and Development (Fourth Edition)* and/or the contractual requirements of any affected private (fee) surface owner(s). Additionally APC estimates that vehicle traffic (non-round trips) would be as shown in Table 2-6, above.

Mitigation Measures

In addition to the COAs in the PRB FEIS ROD, APC committed to the implementation of the mitigation measures in Appendix A - Applicant Committed Measures and Appendix B - the Master Integrated Pest Management Plan in the project area. The effects of these applicant committed measures form part of the proposed action and are analyzed in this document. If the BLM approves subsequent APDs in the project area, APC would be required to:

- Comply with approved APDs (including the programmatic mitigation measures in the PRB FEIS ROD and this EA that the BLM warrants for a specific well location), applicable laws, regulations, orders, and notices to lessees.
- Obtain necessary permits from agencies.
- Incorporate into their APDs any additional, site-specific measure identified during on-sites and required to alleviate resource impacts.
- Certify they have a surface access agreement with the landowner(s) or posted a 43 CFR 3814.1 bond.

Table 2-7. Summary of New Disturbance from the Proposed Action

Facilities	Initial Surface Disturbance			Post Interim Reclamation Surface Disturbance		
	ROW (ft.) or Acres/Facility	*Number or Miles*	*Acres*	*ROW (ft.) or Acres/Facility*	*Number or Miles*	*Acres*
Roads						
New Well Access Roads	60 feet	11 miles	80	45 feet	11 miles	60
Upgrade Existing Well Roads[1]	15 feet	8 miles	15	0 feet	8	0
Well Pads						
Single and Multi-well Pads	12 acres	24	288	3 acres	24	72
Construction/Production Facilities						
Compressor Stations[2]	4 acres	1	4	4 acres	1	4
Water Tap for Hydraulic Fracturing[3]	0	0	0	0	0	0
Linear Facilities						
Gas Gathering Pipelines - Common ROW[4]	0	19 miles	0	0	19 miles	0
Gas Gathering Pipelines - Adjacent to Existing Road[4]	50 feet	20 miles	121	0	20 miles	0
Gas Transport Pipelines (Cross-country, Buried)[5]	50 feet	5 miles	30	0	5 miles	0
Water Connecting Pipelines (Buried)[6]	75 feet	7 miles	64	0	7 miles	0
Electric Power Lines (Buried)[7]	20 feet	4 miles	10	0	4 miles	0
Electric Power Lines (Overhead)[8]	30 feet	5 miles	18	9 feet	5 miles	5
TOTAL	***Short term 630 acres***			***Long term 141 acres***		

Source: ICF 2012

NOTE: Complete reclamation in the long term is anticipated for buried pipelines and distribution lines. Therefore, the assumed Post Interim Reclamation Surface Disturbance associated with these features is assumed to be zero acres.

[1] Average existing road disturbance width of 45 feet based on review of aerial photography; 15 feet of additional (new) disturbance needed to make road passable for project equipment. Final, long term road disturbance on upgraded roads would be the same as existing (i.e., pre-proposed action) disturbance for upgraded roads.

[2] One new compressor station will be installed adjacent to a horizontal well pad within the project area. No additional roads will be required to access the compressor station. New cross-country pipeline to reach third party tie-in appears under linear facilities.

[3] Water tap is assumed to be on a project well pad; no additional disturbance is anticipated.

[4] Surface disturbance from buried pipelines in new or upgraded road ROWs is assumed to be within the new road disturbance. Additional, new disturbance would occur along the existing backbone road.

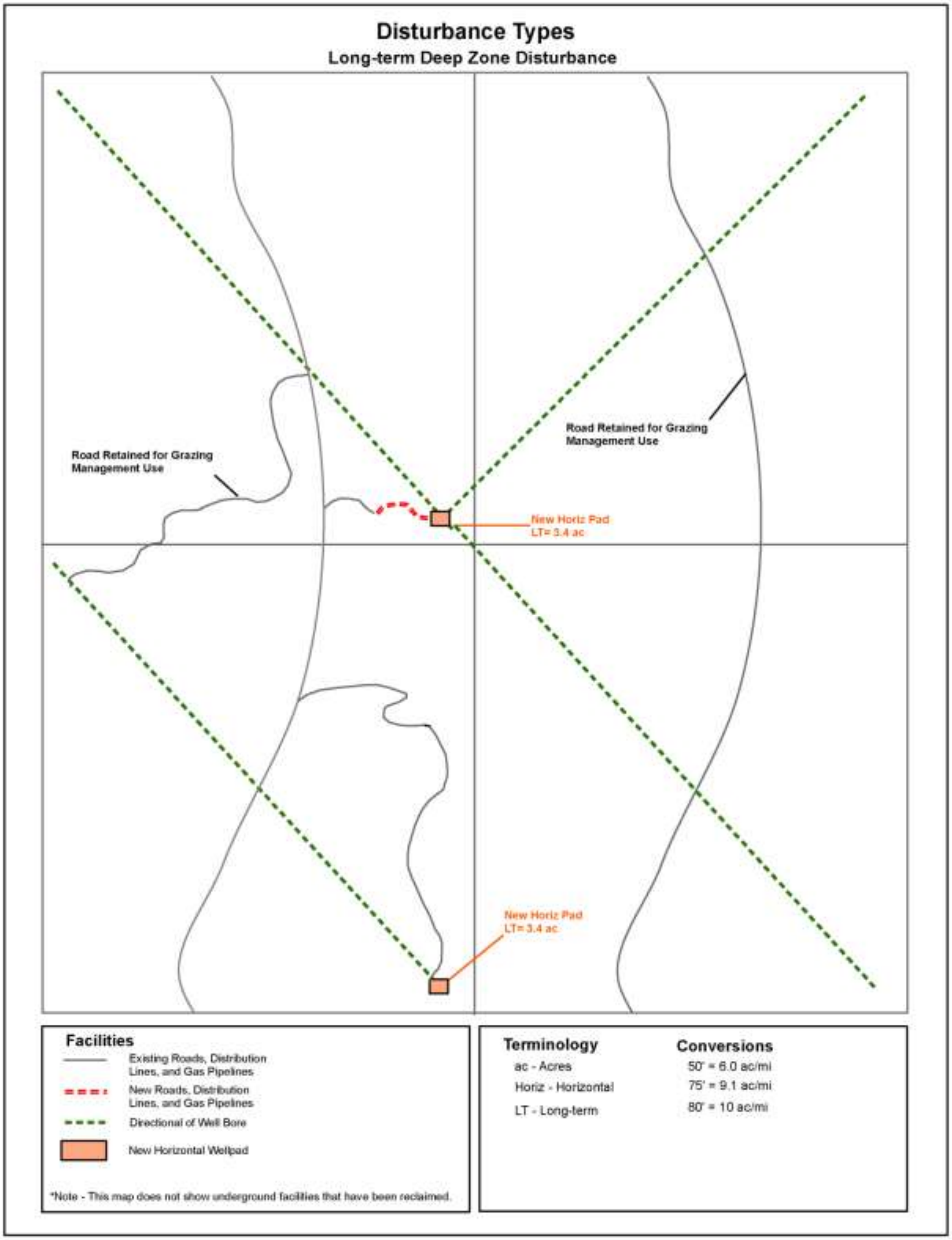
[5] New pipeline following existing road for 3.55 miles and new cross-country pipeline for 0.95 miles; both sections result in new surface disturbance.

[6] Water pipeline ROW width from Greater Natural Buttes FEIS p. 2-23; assumes cross-country pipeline from Table Mountain 4 POD area to a well pad in the project area with the watertap.

[7] Surface disturbance from buried distribution lines would likely occur outside of new or upgraded common road ROW (i.e., not within the new road disturbance).

[8] Assumes a 30-foot wide initial disturbance based on analysis in the PRB FEIS. Long term disturbance is assumed to be approximately 30 percent of the initial disturbance. The use of existing Powder River Energy Corp distribution lines along the backbone road and elsewhere throughout the project area would not result in additional disturbance.

Figure 2-6. Typical Long-term Deep Zone Disturbance following Final CBNG Reclamation



Future Siting for Well Pads and Other Infrastructure
The locations of proposed well pads, roads, and other project infrastructure in the project area, as well as the timing of disruptive and surface disturbing activities, will be determined during future siting-level NEPA analyses, and will be based on various resource considerations and constraints. In general, APC would site wells based on the following considerations:

- Topography
- Landowner conditions
- Existing infrastructure
- Site access
- Wildlife stipulations (where present on BLM-administered lands or mineral estate)
- Surface conditions (for example, to avoid wetlands and consider reclamation potential)

The applicant committed measures in Appendix A contain specific constraints and considerations that APC and BLM will apply during project siting.

Reasonably Foreseeable Development
It is reasonably foreseeable development that APC and other operators holding mineral leases in and adjacent to the CCE analysis area may propose other developments through notices of staking, APDs, or mine plan of operations. It is reasonable that the development may exceed the analysis number of pads, wells, roads, and other infrastructure if production and its economics allow. It is also reasonable to foresee further development of oil or gas storage, pipelines, electrical power, compressor stations, etc. It is also foreseeable that operators may later employ enhanced recovery technologies. Deep reservoir and horizontal drilling technologies in these formations in Wyoming are still in an exploratory phase. Future technological advances may present additional opportunities to reduce completion pad sizes and/or reduce aggregate surface disturbances. Technologies currently under development with potential application to future wells drilled in the CCE area include, but are not limited to: 1) the use of longer laterals to access a greater reach of reserves with fewer wellbores; 2) multilateral wells accessing different formations with additional laterals from the same vertical wellbore; 3) hydraulic fracturing tanks capable of holding greater water volumes using smaller footprints; 4) infill drilling to access additional reserves by drilling wells in closer proximity to one another; and 5) exploring options to install an oil and/or water gathering system, using existing or augmented infrastructure, with new buried pipelines to well pads. Such systems would only be considered under full field development, and therefore approval is outside this analysis.

2.3. Summary of Alternatives

Table provides a summary of the infrastructure currently existing or approved in the project area (Alternative A – The no action alternative) and the infrastructure proposed by APC (Alternative B – The proposed action alternative). For additional information on the basis for figures shown in association with the proposed action, see Table 2-7.

2.4. Conformance to the Land Use Plan and Other Program Guidance

Final conformance determinations rest on subsequent analyses of site-specific proposals to preclude the BLM from pre-judging the analysis and their details. This CCE conceptual proposal generally does not diverge from the 1985 Buffalo RMP, the 2001 and 2011 amendments, and the 2003 PRB FEIS and RMP Amendment and ROD. The proposal generally conforms to laws and regulations including FLPMA, the National Historic Preservation Act, the Endangered Species Act, the Migratory Bird Treaty Act, the Clean Water Act, the Clean Air Act, the National Environmental Policy Act, and DOI Order 3310.

Table 2-8. Summary of Alternatives

Facility	Alternative A	Alternative B[1]
	No Action: Existing and Approved[2]	***Proposed Action: Initial disturbance/Long-term disturbance***
Horizontal Wells	2 (25 acres initial disturbance)	24 (288 acres) / (72 acres)
CBNG Wells[3]	233 (47acres)	0 (0 acres)

Table 2-8. Summary of Alternatives

Facility	Alternative A	Alternative B[1]
	No Action: Existing and Approved[2]	***Proposed Action: Initial disturbance/Long-term disturbance***
Non-CBNG Vertical Wells	83 (159 acres)	0 (0 acres)
Existing Project Area Backbone Road[4]	20 miles (205 acres)	0 miles
Existing Well Access Roads[5]	58 miles (317 acres)	0 miles
Upgraded Well Access Roads	0 miles (0 acres)	8 miles (15 acres) / (0 acres)
New Access Roads	0 miles (0 acres)	11 miles (80 acres) /(60 acres)
Power lines - Buried	6 miles (0 acres)	4 miles (10 acres) / (0 acres)
Power lines - Overhead	67 miles (73 acres)	5 miles (18 acres) / (5 acres)
Existing Gas Pipelines - Buried	28 miles (0 acres)	0 miles
Gas Gathering Pipelines - Common ROW	0 miles (0 acres)	19 miles (0 acres) / (0 acres)
Gas Gathering Pipelines - Adjacent to Existing Road	0 miles (0 acres)	20 miles (48 acres) / (0 acres)
Gas Transport Pipelines (Cross-country, Buried)	0 miles (0 acres)	5 miles (30 acres) / (0 acres)
Compressor Stations	0 (0 acres)	1 (4 acres) / (4 acres)
Water Connecting Pipelines (Buried)	0 miles (0 acres)	7 miles (64 acres) / (0 acres)
Total Surface Disturbance	**827 acres**	**630 acres / 141 acres**
Total Surface Disturbance: Existing and Proposed Action	**Initial Disturbance: 1,457 acres Long-term Disturbance: 968 acres**	

Source: ICF 2012 *NOTE: Complete reclamation in the long term is anticipated for buried pipelines and distribution lines. Therefore, the assumed Post Interim Reclamation Surface Disturbance associated with these features is assumed to be zero acres. For exiting, buried linear features, interim reclamation is assumed to have occurred.*

[1] Acres or mileage in the proposed action alternative represent additional facilities and do not include the existing facilities listed under the no action alternative. For additional information on the basis for figures shown for the proposed action, see Table .

[2] Approved via WY070-CX3-12-12, WY070-CX3-12-17, WY070-CX3-12-18, & WY-070-CX3-12-19.

[3] The WOGCC identifies 316 producing oil/gas well in the project area. To identify CBNG wells, water rights information from the Wyoming State Engineer's office was reviewed. Based on this review, 233 wells are assumed to be CBNG, and the remaining wells are assumed to be conventional vertical oil and gas wells. Area of disturbance assumptions for CBNG wells of 0.2 acres/well taken from Table Mountain Phase 4 CBNG POD; existing, conventional well surface disturbance assumptions for 1.9 acres/well taken from PRB FEIS, pp. 2-41 and 4-312.

[4] Existing road disturbance acreage based on aerial photography review showing 86 foot width for the backbone road.

[5] Average existing road disturbance width of 45 feet based on review of aerial photography; 15 feet of additional (new) disturbance needed to make road passable for project equipment. Final long-term road disturbance on upgraded roads would be the same as existing (i.e., pre-proposed action) disturbance for upgraded roads.

3. AFFECTED ENVIRONMENT

This section briefly describes the physical and regulatory environment potentially significantly affected by the alternatives in Section 2. The BLM ID team screened the issues in Table C-1 for potentially significantly affected issues that are the focus of this EA; see subsection 1.4. The PRB FEIS considered a no action alternative (pp. 2-54 to 2-62) in evaluating a development of up to 54,000 fluid mineral wells. All of the CBNG wells and over 60% of the deep oil and gas wells are hydraulically fractured; BLM and Goolsby 2012. The BLM uses the aggregated effects analysis approach incorporating by reference the circumstances and developments approved via the subsequent NEPA analyses for adjacent and intermingled developments coincident to proposal area to retain currency in the no action alternative. See Appendix C. There are 316 producing oil and gas wells in the CCE area, WOGCC 2012b. The State of Wyoming and BLM also approved dozens of wells that operators may develop in the near future. In addition, APC and other operators are likely to continue seeking permits to develop unconnected leases in or in the affects analysis areas near the CCE area; decisions to approve or deny future proposals will occur following APD submittal. Development occurring on fee surface and mineral estate would continue. A summary comparison of the no action alternative and the proposed action is in Table 2-8.

The CCE topography has moderately rough terrain with many ridges and deep draws. Pumpkin Buttes are approximately 1 mile southeast of the project area. The elevation in the project area is averages 5,000 feet above sea level. The project area is in sparse dry herbaceous rangeland and sagebrush east of the Powder River. The area is in the PRB, a Level IV ecoregion, in the Northwestern Great Plains Level III ecoregion – an area of semiarid rolling plains with occasional buttes or badlands that is predominately used for livestock grazing, dryland farming, wildlife habitat, and mineral development, Chapman et al. 2004. The PRB ecoregion is a western mixed-grass/short- grass prairie, Curtis and Grimes 2004.

3.1. Air Quality

No site-specific air quality data are available from the immediate project area. Despite this knowledge gap the air quality in the PRB is generally good, with existing air quality listed as "unclassified/attainment" with all ambient air quality standards. There are limited industrial or residential air pollution emissions sources in the PRB and good atmospheric dispersion of air pollutants due to the frequent windy conditions (BLM 2005). Refer to the PRB FEIS pp. 3-291 to 3-299, for a 2003-era description of the air quality conditions. BLM also incorporates by reference, Update of Task 3A Report for the Powder River Basin Coal Review Cumulative Air Quality Effects for 2020 (BLM 2009b), as it captures the cumulative air quality effects of present and projected PRB fluid and solid mineral development.

Despite current attainment with federal and state standards, air quality is a rising concern in the PRB, in light of the Environmental Protection Agency's (EPA) determination of the oil and gas producing Upper Green River Basin in southwest Wyoming as one of the nation's 40 "nonattainment" zones for ozone in 2012. The EPA established ozone standards in 2008, finalizing them in 2011. In addition, air quality alerts were issued in 2011 and 2012 in the PRB for particulate matter (PM) attributed to coal dust. BLM received anecdotal reports of air quality issues from oil or gas development potentially affecting people and livestock in western Colorado and North Dakota. Air quality in the PRB is also evaluated under the Prevention of Significant Deterioration (PSD) program. The northeast Wyoming visibility study is ongoing by the Wyoming Department of Environmental Quality (WDEQ).

Four sites monitor the air quality in the PRB: Cloud Peak in the Bighorn Mountains, Thunder Basin northeast of Gillette, Campbell County south of Gillette, and Gillette. In addition, the Wyoming Air Resource Monitoring System (WARMS) measures meteorological parameters from 6 sites, and particulate concentrations from 5 of those sites, monitors speciated aerosol (3 locations), and evapotranspiration rates (3 locations). These sites are at Sheridan, Taylor Reservoir, South Coal Reservoir, Buffalo, Juniper, and Newcastle. One additional WARMS site is planned for construction in the Fort Creek area. Air quality monitoring sites adjacent to the Wyoming PRB-area are at Birney on the Tongue River 24 miles north of the Wyoming-Montana border, Broadus on the Powder River in Montana, and Devils Tower. Existing air pollutant emission sources in the region include:

- Exhaust emissions (primarily carbon monoxide (CO) and nitrogen oxides (NO_x)) from existing natural gas fired compressor engines used in production of natural gas and CBNG; and, gasoline and diesel vehicle tailpipe emissions;
- Particulate matter (PM) (dust) generated by vehicle travel on unpaved roads, windblown dust from neighboring areas, road sanding during the winter months, and coal mines and trains;
- Transport of air pollutants from emission sources located outside the region;
- Urban corridor emissions;
- NO_x, PM, and other emissions from diesel trains; and,
- Sulfur dioxide (SO_2) and NO_x from power plants.

3.1.1. Existing Oil And Gas Emission Sources

No project area specific emissions inventory exists; yet it is possible to get a sense of current emissions from oil and gas wells in the CCE area. The per-well estimated emissions in Table 3- are based on emission factor estimates developed from the *Supplemental Air Quality Analysis to the Draft Supplement to the Montana Statewide Oil and Gas Environmental Impact Statement and Amendment of the Powder River and Billings Resource Management Plans*, BLM 2007b. To estimate potential emissions from existing wells, BLM applied these per-well estimates to the existing, producing - wells in the CCE area, WOGCC 2012b. Emissions factors for CBNG wells provided in the Supplemental Air Quality Analysis document, BLM 2007b, include emissions from wells and ancillary collection / processing facilities (e.g., compressors). In contrast, emissions factors for conventional oil and gas wells in that document do not include compressor, dehydrator, or compressor station sources. As a result of considering all collection/processing facility emissions as part of CBNG well estimates, the numbers in Table 3- may underestimate emissions from conventional oil and gas and/or overestimate emissions from CBNG.

Table 3-1. Emissions Estimate for the Project Area and Per Well

Development Type[1]	**Emissions (tons per year)**				
	NO_x	***PM_{10}***	***SO_2***	***CO***	***VOC***
Existing Conventional Oil and Gas (83 wells)[2]					
Production and Operations[3]	2.324 (0.028 per well)	1.904 (0.023 per well)	0.170 (0.002 per well)	0.530 (0.006 per well)	0.181 (0.002 per well)
Existing CBNG (233 wells)[2]					
Production and Operations[3]	64.525 all wells (0.277 per well)	5.916 all wells (0.025 per well)	0.222 all wells (0.001 per well)	78.147 all wells (0.335 per well)	35.952 all wells (0.154 per well)

Note: Total emissions may not correspond exactly to per-well emissions due to rounding. Source for emissions factors: *Supplemental Air Quality Analysis to the Draft Supplement to the Montana Statewide Oil and Gas Environmental Impact Statement and Amendment of the Powder River and Billings RMP* (BLM 2007b); pp. A-39 and A-61.

1 The WOGCC identifies 316 producing oil/gas wells in the project area. To identify CBNG wells BLM reviewed water rights information from the Wyoming State Engineer's office. Based on the review BLM assumed 233 wells are CBNG, and the remaining wells are conventional oil and gas wells. Two existing wells are assumed to be in production and operations.

2 Per-well emissions factors for conventional oil and gas, based on the emissions inventory conducted as part of the *Air Quality Technical Support Document* (BLM 2002), do not include emissions for operations associated with compressors, dehydrators, or compressor station visits because the inventory assumed that compressor and dehydrator installation would coincide with CBNG operations and the small amount of conventional gas would be mingled with CBNG, so no additional compression or dehydration would be required. These assumptions could understate the emissions from conventional oil and gas wells in the project area, and could result in greater emissions estimates for CBNG wells than might be typical for wells of this type.

3 Existing wells are assumed to be in production and operations.

3.2. Soils, Vegetation, and Ecological Sites

3.2.1. Soils

Project area soils developed in alluvium and residuum derived mainly from the Wasatch Formation. Lithology consists of light to dark yellow and tan siltstone and sandstones with minor coal seams resulting in a wide variety of surface and subsurface textures. Soil depths vary from deep on lesser slopes to shallow and very shallow on steeper slopes. Differences in lithology produced topographic and geomorphic variations in the area. An erosion resistant cap of clinker, terrace gravels, or sandstone often protects ridges and hills. Parent material chemistry may result in local concentration of salts. Soils differ with topographic location, slope, and elevation. The soil available for reclamation ranges from 2 inches on ridges to 12 or more inches in bottomland – where topsoil is present. Erosion potential varies depending on the soil type, vegetative cover, and slope. Reclamation potential of soils also varies throughout the project area. The primary soil limitations in the project area include: depth to bedrock, low organic matter content, and high erosion potential especially in areas of steep slopes. The depth to bedrock in the project area ranges from 0 inches to 39 inches, with an average (weighted by map unit area) depth to bedrock of 15 inches (NRCS 2012).

The Wyoming Soil Survey Geographic (SSURGO) Database provides detailed soils identification and data on soil properties. The BLM uses county soil survey information to predict soil behavior, limitations, or suitability for a given activity or action. The agency's long term goal for soil resource management is to maintain, improve, or restore soil health and productivity, and to prevent or minimize soil erosion and compaction. Soil management objectives are to ensure that adequate soil protection is consistent with the resource capabilities. Many of the soils and landforms of this area present distinct challenges for development, and /or eventual site reclamation (Map 3). The project area contains approximately 70 unique soil mapping units. Table lists soils mapping units comprising 3% or more of the project area. Soils along the potential water pipeline from Table Mountain to the project area are similar to those in the project area, and include similar proportions of sensitive soil areas (i.e., large areas of poor reclamation suitability soils, and smaller areas of soils susceptible to erosion and slopes in excess of 25%).

Table 3-2. Map Unit Symbol (MUS) of Important Soils and Ecological Sites in the Project Area

MUS	Map Unit Name	Ecological Site(s)	Acres	Project Area %
SNe	Shingle-Tassel association	Shallow Loamy (10-14NP)	15,216	42%
		Shallow Sandy (10-14NP)		
		Loamy (10-14NP)		
VC	Valent-Cushman association	Sands (10-14NP)	2,267	6%
		Loamy (10-14NP)		
		Shallow Sandy (10-14NP)		
709	Theedle-Shingle loams, 3 to 30 % slopes	Loamy (10-14NP)	1,958	5%
		Shallow Loamy (10-14NP)		
233	Ustic Torriorthents, gullied	N/A	1,299	4%
TE	Terry-Tassel association	Sandy (10-14NP)	1,233	3%
		Shallow Sandy (10-14NP)		
		Shallow Loamy (10-14NP)		
STd	Stoneham-Cushman association	Loamy (10-14NP)	1,084	3%
		Loamy (10-14NP)		
MP	Maysdorf-Pugsley association	Loamy (10-14NP)	1,005	3%
		Loamy (10-14NP)		
		Loamy (10-14NP)		
210	Shingle-Taluce complex, 3 to 30% slopes	Shallow Loamy (10-14NP)	965	3%
		Shallow Sandy (10-14NP)		

Source: NRCS 2012

The Shingle-Tassel association, which has moderate erosion hazard ratings, covers approximately 42% of the project area with a topsoil depth 10 inches or less. The Shingle component is 40% of the map unit, is found on hills and ridges, and consists of residuum weathered from shale. This complex has components that occur at an approximate proportion of 40, 25, and 15% of the map unit. The Shingle is loamy, the Tassel soil is comprised of sandy-loams, and Kim soils have a loam surface and silt loam subsoil. On the surface, vegetation cover is good on level areas and sparse or barren on slopes. The map unit is highly dissected and gullied with active erosion ranging from slight to severe. The Kim soils are gently sloping to sloping. The dominant components of the complex (Shingle and Tassel soils) have a poor rating as a source of topsoil or reclamation material. Paralithic (soft) bedrock occurs 8 to 10 inches from the soil surface. The Kim soils have a fair rating as a source of topsoil or reclamation material, and have topsoil depths greater than 60 inches. Additional information regarding the physical characteristics of individual soils in each of these soil mapping units may be obtained from the South Campbell (WY605), North Johnson (WY719), and South Johnson (WY619) County, Wyoming Soil Surveys published by the U.S. Department of Agriculture, Natural Resources Conservation Service.

3.2.1.1. Soils Susceptible to Erosion

Soil formation is a slow process. Most soils cannot renew their eroded surface and productivity while erosion continues. The development of a favorable rooting zone by the weathering of parent rock is much slower than development of the surface horizon. These very slow renewal rates support the philosophy that any soil erosion is too much. Loss of organic matter, resulting from erosion and tillage, is one of the primary causes for reduction in production yields. Soil aggregate stability, the soil's ability to hold moisture, and the cation exchange capacity decline when organic matter decreases, USDA 1998. Soils are susceptible to erosion in varying degrees. For example, a sandy ecological site has sand ranging from 52 to 80% in the top few inches and clays ranging from 10 to 18%. A sandy ecological site on a ridge top with topsoil depths averaging 2 to 4 inches could be susceptible to wind and water erosion due to small amounts of clay and little water holding capacity. Severe water and wind erosion hazards for soils are present in the project area, see Map 3. Table lists the relative erosion potential in the project area for wind and water hazards. Traffic on slopes of 8% or greater may cause unacceptable erosion.

Table 3-3. Relative Erosion Potential

Erosion Potential	Acres	% of Project Area
Water - Severe	3,008	8
Wind - Severe	779	2

Source: BLM 2012b

3.2.1.2. Limited Reclamation Potential

Areas of limited reclamation potential (LRP) are areas with fragile geologic formations, limiting soil conditions, biological soil crusts, or rocky terrain with limited vegetative cover that can make attempts at meeting all reclamation requirements difficult or impossible. These areas can result from active erosion, washing by water, unfavorable soil conditions, or human activities (such as large-scale excavations for oil and gas development). LRP soils were identified using NRCS SSURGO data as soil mapping units containing a named component described as a miscellaneous area. Miscellaneous areas such as a badlands or rock outcrops may be limited to a portion of these soil map units, and would be identified during the onsite investigation. Additionally, there may be minor components in the project area identified during onsite investigations that are not identified in the SSURGO data. Badlands components are associated with the Shingle-Taluce-Badland and the Samday-Shingle-Badland complexes, cumulatively comprising about 3% of the project area. Bandlands are approximately 15% of each of these 2 soil complexes and cover approximately 324 acres (less than 1%) of the project area.

3.2.1.3. Slopes in Excess of 25 Percent

Soil stability is greatly affected by slope. In general, the potential for slumping, landslides, and water erosion rises with increasing slope. Approximately 1,846 acres (5%) of the project area have slopes of 25% or more; see Table , below. Soils with slopes of less than 25% may also be prone to high erosion because of the soil type, particle size, texture, or amount of organic matter. Areas of slighter slopes and area near drainages usually have deeper soils. Deeper soils tend to have a higher probability of supporting shrubbrush grassland communities. Soil types in the project area with severe erosion potential and slopes 25% or greater, as defined by the NRCS (USDA 1993), are listed above in Table , along with the number of acres and percentage of the project area. Development on natural topography with 25% or greater slopes is generally constrained due to their limited reclamation potential, increased risk of soil slumping or mass failure, and high probability of irrecoverable soil losses.

Table 3-4. Soil Slope Percent in the Project Area

% Slope	Acres	% of Project Area
0-24%	34,254	95

Table 3-4. Soil Slope Percent in the Project Area

% Slope	Acres	% of Project Area
Greater than or Equal to 25%	1,846	5

Source: BLM 2012b

3.2.1.4. Poor Reclamation Suitability

Oil and gas development, as well as traditional activities such as livestock grazing and wildlife use, impact current soil conditions in the project area. Area soils are easily damaged by use or disturbance and are difficult to revegetate or otherwise reclaim. Soil impacts from roads, linear pipeline scars, artificial wet areas, and other surface disturbing activities can be readily observed in the area. In the absence of recoverable topsoil, as is common throughout the project area, the surface organic matter in the form of vegetation, litter, and biological crust are critical to maintaining the integrity and viability of the soil. Soils with poor reclamation suitability comprise 25,042 acres (69%) of the CCE area. Many of the area soils and landforms present distinct challenges for development and reclamation. The main CCE area soil limitations include: depth to bedrock, low organic matter content, and high erosion potential, especially in areas of steep slopes.

3.2.2. Vegetation and Ecological Sites

Dominant vegetation community types in the CCE area include mixed-grass prairie and sagebrush shrubland (shrub steppe). The PRB FEIS, pp. 3-92 to 3-103, has discussions on mixed-grass prairie and sagebrush shrubland habitats. Table 3-5, below, lists identified vegetation types and their total acreages in the project area. The area along the potential pipeline from Table Mountain also consists of sparse, dry herbaceous vegetation, with small areas of big sagebrush and herbaceous rangelands.

The NRCS compiles ecological site descriptions, which are soil and vegetation community descriptions used for the purpose of resource identification, and for providing management and reclamation recommendations.Ecological sites associated with major soil units found in the CCE area are in Table and include shallow loamy, loamy, sands, sandy, and shallow sandy rangeland ecological sites in the 10 to 14-inch Northern Plains Precipitation Zone. Loamy ecological sites (10-14NP) are associated with 5 of the 8 major soil map units found in the project area and are characterized by moderately deep and well-drained soils, slopes up to 30%, and 70% or greater coverage of the soil surface by plants and litter. Cool season bunch grasses are the dominant vegetation type, but species such as blue grama will increase as the site deteriorates. Shallow loamy ecological sites, which occur on steeper slopes, have shallower soils and less surface coverage by plants and litter, USDA 2012. Sandy ecological site types (sands, sandy, and shallow sandy (10-14NP)) are associated with 4 of the 8 soil map units in the CCE area and are characterized by well-drained soils that support tall and mid-stature warm season grasses. Species such as threadleaf sedge and fringed sagewort will replace native grasses as the site experiences deterioration (USDA 2012). It is BLM policy to use native species for interim and final reclamation; yet emerging plant science shows that using a sterile cover crop for immediate stabilization builds and retains soil moisture and sets the conditions for native plants to germinate. Sagebrush does not regenerate easily after disturbance, or after natural occurrences such as wildfire. It takes years, even generations, for sagebrush to return. Studies of Wyoming big sagebrush post fire recovery intervals, indicated that post fire regeneration can take 50 to 120 years to regenerate naturally (Cooper et al. 2007; Baker 2006). Sagebrush still has not returned to some areas of the Columbia Basin burned by a large fire 40 years ago (PNNL 2012). Wyoming big sagebrush took approximately 17 years to re-establish after chemical removal in Wyoming (Johnson 1969) and sagebrush species can take only 3 to 7 years to begin to spread in locations where seed drilling or transplant of seedlings occurred (Tirmenstein 1999). Approximately 7,097 acres of Big Sagebrush vegetation cover exist in the project area (refer to Section 3).

Table 3-5. Vegetation Cover Types in the Project Area

Vegetation Cover Type	Acres	% of Project Area
Sparse, Dry Herbaceous	28,244	78%
Big Sagebrush	7,041	20%
Thin, Dry Herbaceous	717	2%
Big Sagebrush I	56	<1%
Rock, Bare Soil	40	<1%
Low, Medium Herbaceous	2	<1%

Source: USDA 2012.

3.3. Water Resources

3.3.1. Ground Water Resources

The WSEO lists 237 permitted water wells in the CCE area, the majority of which (226) are associated with CBNG well development, WSEO 2012. Refer to *Section 3.4.1- Leasable Oil and Gas* for information on produced water volumes in the project area. The intentional production or appropriation of groundwater from CBNG production led to the designation of CBNG produced water as a beneficial use, subject to administration and permitting by the WSEO under Wyoming Statue §41-3-930. The non-CBNG wells in the project area are found in Table and include (WSEO 2012):

- 6 wells designated exclusively for stock watering purposes with depths ranging from 4 to 500 feet.
- 1 x 7,200-foot well owned by APC and designated for stock, irrigation, and miscellaneous uses (Culp Draw Unit WSW #1).
- 4 monitoring wells drilled in conjunction with mining activities conducted/proposed by Cogema Mining, Inc. and WPX Energy Rocky Mountain, LLC, with depths ranging from 61 to 380 feet.

Table 3-6. Existing Non-CBNG Water Wells and Their Locations in the Project Area

Permit #[1]	Permit Type	Qtr/Qtr	Section	Township	Range	Well Depth (feet)
P55651.0W	Stock	SW¼ SW¼	8	45 North	76 West	157
P62795.0W	Stock	SW¼ NW¼	17	45 North	76 West	164
P34781.0W	Stock	SE¼ NW¼	21	45 North	76 West	4
P43308.0W	Stock	SW¼ NE¼	29	45 North	76 West	464
P183765.0W	Stock	NW¼ SW¼	12	46 North	77 West	500
P50347.0W	Stock	SW¼ SW¼	12	46 North	77 West	260
P182026.0W	Irrigation; Stock; Miscellaneous	NE¼ NE¼	36	46 North	77 West	7,200
P101844.0W	Monitoring	NE¼ NE¼	5	46 North	77 West	380
P101845.0W	Monitoring	SE¼ NE¼	5	46 North	77 West	330
P101847.0W	Monitoring	NE¼ SE¼	5	46 North	77 West	320
P163947.0W	Monitoring	NE¼ NW¼	28	47 North	77 West	61

[1] Data is from the Wyoming State Engineer's Office e-Permit database (WSEO 2012).

The Fox Hills/Lance aquifers are the primary groundwater resources underlying the CCE area. The overlying Lance Formation ranges from 600 to 3,000 feet thick and is generally unsuitable for irrigation due to high salinity and/or sodium content. This water is historically used for domestic and livestock despite generally low well yields, uneconomical drilling depths, high total dissolved solids (TDS) concentrations, high sodium absorption ratio (SAR), and the presence of other undesirable constituents, HKM 2002; BLM 2006. The underlying Fox Hills Sandstone has a maximum thickness of approximately 700 feet and has historical uses and water quality characteristics similar to those of the Lance Formation, BLM 2006. Municipal use is limited by high fluoride content on the east side of the PRB, HKM 2002.

3.3.2. Surface Water Resources

The CCE area is in the Powder River watershed. All Powder River tributaries in the project area are intermittent or ephemeral. About 2,778 acres (8%) of the project area is within a 300-foot buffer of surface water. The area of the potential water pipeline from Table Mountain is not within 300 feet of surface waters. There are 20 permitted reservoirs in the project area, including 1 industrial, 16 for stock watering, 3 used for CBNG and stock (WSEO 2012); see Table . APC is not currently surface discharging produced water from CBNG wells in the project area. APC pipes produced water from its existing wells to Salt Creek for use in its other projects.

Table 3-7. Permitted Reservoirs, Locations, and Capacity in Acre-feet in the Proposal Area

Permit #[1]	Permit Type	Qtr/Qtr	Section	Township	Range	Reservoir Capacity
P4029.0S	Stock	SW¼ SE¼	26	045 North	076 West	8.48
P17872.0S	Stock	SE¼ NW¼	30	046 North	076 West	8
P17875.0S	Stock	SW¼ NW¼	31	046 North	076 West	17.3
P2969.0S	Stock	NW¼ SE¼	31	046 North	076 West	10.41
P8682.0R	Industrial	NW¼ SW¼	31	046 North	076 West	203.27
P17825.0S	Stock	SW¼ NW¼	08	046 North	077 West	15.71
P17781.0S	Stock	NW¼ NE¼	11	046 North	077 West	15.63
P19580.0S	Stock	NW¼ NE¼	11	046 North	077 West	19.98
P17832.0S	Stock	NE¼ NE¼	12	046 North	077 West	8.79
P18062.0S	Stock	NW¼ SW¼	12	046 North	077 West	15.97
P19573.0S	Stock	NE¼ NE¼	12	046 North	077 West	12.65
P13845.0R	CBNG; Stock	NW¼ SW¼	12	046 North	077 West	24.98
P18045.0S	Stock	NW¼ NE¼	24	046 North	077 West	17.58
P13838.0R	CBNG; Stock	SW¼ SE¼	24	046 North	077 West	23.83
P10443.0S	Stock	NW¼ NE¼	25	046 North	077 West	18.15
P16637.0S	Stock	not provided	28	047 North	077 West	10.71
P19577.0S	Stock	NE¼ NW¼	28	047 North	077 West	16.59
P17142.0S	Stock	SW¼ SE¼	29	047 North	077 West	9.96
P19576.0S	Stock	SW¼ SE¼	29	047 North	077 West	13.06
P12503.0R	CBNG; Stock; Wildlife	NE¼ NE¼	34	047 North	077 West	23.36

[1] Data gathered from the computerized records of the Wyoming State Engineer's Office (WSEO 2012).

3.2. Mineral Resources

3.4.1. Leasable Oil and Gas

Operators drilled about 358 oil/gas wells in the project area, of which 316 are actively producing (see Map 4) (WOGCC 2012b). See Table 3-8. There are 115 active drilling permits, 47 of which are APC's - including 2 submitted as confidential; see the WOGCC and geodatabase from the U.S. Geological Survey (USGS) historic data (1900-2010). Operators drilled the first producing oil wells in the project area in the 1970s (Biewick 2011). Production decreased during the 1980s and then peaked in the 1990s with a total of 525,860 barrels produced during that decade. Producing oil and gas wells in the CCE area recovered an estimated 7.6 million barrels of oil between 1900 and 2010. The first gas wells were drilled in the CCE area in 2000, but have since proliferated, recovering a total of approximately 63 million Mcf of gas. An additional 2 million Mcf (or 1,000 cubic feet) of gas was gathered from oil wells in the project area from 1900 to 2010 (Biewick 2011). The BLM currently authorizes drilling of the Shannon, Sussex, Steele, Niobrara, and Carlisle formations in the project area The USGS finds the remotest chance of measurable detection or damage in induced seismic events from the nation's hydraulic fracturing or over 40,000 permitted water injection wells (USGS 2012a). This proposal targets volume that is smaller than those found in the USGS studies and BLM needs site-specific proposals to complete further analysis.

Table 3-8. Existing Oil/Gas Wells, Operator, and Their Water Production in the Proposal Area

Well Status	Well Owner/Operator		Total Wells	Cumulative Water Production[2]
	Anadarko	***Other***		
Producing Gas	7	262	269	77,983,707 bbls
Producing Oil	46	1	47	4,577,802 bbls
Permanently Abandoned	3	17	20	26,247 bbls
Shut-In	3	12	15	4,650,433 bbls
Temporarily Abandoned	6	1	7	259,035 bbls
Total	**65**	**293**	**358**	**87,497,224 bbls**

[1] Source: WOGCC 2012b. [Anadarko refers to Anadarko Petroleum Company]
[2] Cumulative (lifetime) produced water production. [bbls = barrels or 42 US gallons]

3.4.2. Locatable Minerals

The Pumpkin Buttes Uranium District (PBUD) overlaps 22,682 acres of the CCE area, see Map 5. The PBUD is an area with a high potential for uranium, BLM 2009a. Uranium deposits in the PBUD are of roll-front type deposits of uranium in the sandstones of the Fort Union and Wasatch formations. There are 4 existing lode claims in the project area held by Uranium One Inc., in Township 45 North, Range 76 West, constituting approximately 21 acres each in Sections 4, 33, and 34, BLM 2012a. There are also operational and proposed uranium mines south of the CCE area held by Uranerz Energy Corp. (UEC), Cameco Resources, and Uranium One (Uranerz 2011). UEC, Cameco Resources, and Uranium One operate existing uranium mines south of the project area and are actively developing new mines (Uranerz 2011). UEC's proposed Nichols Ranch ISR project will consist of the 1,120-acre Nichols Ranch Unit in Township 43 North, Range 76 West, and the 2,250 Hank Unit in Townships 43 and 44 North, Range 75 West. The project will result in an estimated 300 acres of surface disturbance during the 10 year life of the mine (less than 60 to 80 acres per year). UEC's monitoring wells will be 1 well per 4 acres in the proposed well field, and spaced at 500-foot intervals around its perimeter. Drilling patterns for injection and recovery wells will vary across the well field depending on the ore zone, but will likely be spaced 50 to 150 feet apart (Uranerz 2010).

3.5. Fire and Fuels

The PRB FEIS analyzed fire and fuels management and effects from oil and gas development, p. 4-153. Increased development of wells and infrastructure increases the potential for human-caused grass and brush fires and readily ignitable invasive species, Gelbard 2003. Yet, the expansion of the existing road network to accommodate oil and gas development may also improve access and, subsequently, the ability of local fire departments to suppress fires. The increased oil and gas development may result in increased fire suppression and ability to rehabilitate and restore burned areas to protect these resources, PRB FEIS, p. 4-153. These similar effects could occur for this project; however, because of the developed nature of the project area and the existing oil and gas facilities, any additional effects from the wells under this proposal would likely be minimal. BLM does not further address fire and fuels in this EA.

3.6. Wetlands and Riparian

The PRB FEIS has detailed discussion on wetland and riparian ecosystems in northeastern Wyoming, pp. 3-108 to 3-113.Wetlands and riparian areas are important water-related features in the arid landscape of northeastern Wyoming. These resources are typically restricted to the lands immediately surrounding major and minor rivers, streams, creeks, draws, topographical depressions, lakes, and ponds. Ephemeral drainages flowing to the Powder River, dissect the majority of the CCE area. The ephemeral drainages have gentle slope with well vegetated bottoms with numerous small head-cut features. There are several small freshwater emergent wetlands in the CCE area, primarily near the southeastern and northeastern boundaries; USFWS National Wetlands Inventory Database (the NWI). There is an area of riparian habitat in the northwestern CCE area. In total, approximately 2,778 acres (8%) of the overall project area is within a 500-foot buffer of riparian habitat. No floodplains were identified in the CCE area during a review of Federal Emergency Management Agency (FEMA) flood maps. The area of the potential water pipeline from Table Mountain is not within 500 feet of known riparian habitat or in a floodplain.

3.7. Invasive, Non-Native Species

The Wyoming Weed and Pest Control Act of 1973 designated as noxious weeds non-native plants that are difficult to control, easily spread, and injurious to public health, crops, livestock, land or other property, (W.S. 11-5-102[a][xi] and W.S. 11-12-104). The cheatgrass proliferation also likely contributes to increasingly frequent and violent wildfires, Balch 2013. The Wyoming Weed and Pest Council has 23 Weed and Pest Districts delineated by county boundaries, maintains a list of state designated and prohibited noxious weeds (WDA 2012b). The districts may declare additional noxious weeds in their localities (W.S. 11-5-102[a][vii] through 11-5-102[a][viii] and W.S. 11-5-105[a][vi]) (WDA 2012a). BLM identified noxious weeds occurring in the CCE area (Table) through communication with the Campbell and Johnson County Weed and Pest Boards, Litzel; Schmelzle pers. comm.

Table 3-9. Noxious or Invasive Weeds Potentially Occurring in the Project Area

Common Name	Scientific Name	Status[1]	Common Name	Scientific Name	Status[1]
Field bindweed	*Convolvulus arvensis* L.	Designated	Scotch thistle	*Onopordum acanthium* L	Designated
Canada thistle	*Cirsium arvense* L.	Designated	Diffuse knapweed	*Centaurea diffusa* L.	Designated
Russian knapweed	*Centaurea repens* L.	Designated	Saltcedar	*Tamarix* spp.	Designated
Common cocklebur	.*Xanthium strumarium* L	Declared	Wild licorice	*Glycyrrhiza lepidota* P	Declared
Buffalobur	*Solanum rostratum* Dunal.	Declared	Black Henbane	*Hyoscyamus niger L.*	Declared

Source: Litzel pers. comm.; Schmelzle pers. comm.
[1] Wyoming Weed and Pest Council (WDA 2012b; WDA 2012a) maintains the declared and designated weed lists.

3.8. Wildlife

The PRB FEIS, pp. 3-113 to 3-206, identified wildlife species likely occurring in the project area. This section provides more information on wildlife species with the potential to occur in or near to the project area and that may potentially receive significant affects from the project. BLM does not address species absent from the CCE area or not potentially significantly affected by the CCE project. The WGFD's Recommendations for Development of Oil and Gas Resources within Important Wildlife Habitats (WGFD 2010), made no distinction in surface disturbance impacts per well type or drilling technology.

3.8.1. Big Game Species

The PRB FEIS has detailed discussion for pronghorn, mule deer, white-tailed deer, and elk, see pp. 3-117 to 3-122, 3-127 to 3-132, 3-122 to 3-127, and 3-132 to 3-140, respectively. Based on the species distribution and habitat information in the WFGD *Atlas of Birds, Mammals, Amphibians, and Reptiles in Wyoming*, several big game species including elk (*Cervus canadensis*), mule deer (*Odocoileus hemionus*), pronghorn antelope (*Antelocapra americana*), and white-tailed deer (*Odocoileus virginianus*), may occur in the general vicinity of the project area (Orabona et al. 2012). No crucial range, parturition areas, or migration routes for these big game species overlap the CCE area (WISDOM 2012); however, year-long and winter/yearlong range for pronghorn and mule deer are present in most of the project area (BLM 2012b); see Table . Range designated by the WGFD as winter/yearlong is used by a population or portion of the population on a year round basis, with significant influx of additional animals into the area from other seasonal ranges during the winter months (from December 1 and April 30). While no designated ranges for elk or white-tailed deer overlap the CCE area or the potential water pipeline from Table Mountain, these species may use the area at times when suitable habitat and conditions exist.

Table 3-10. Big Game Ranges and Herd Units in Project Area

Common Name	Scientific Name	Range in Project Area (acres)[1]		Herd Units in Project Area (name)[1]
		Winter/Yearlong	*Yearlong*	
Elk	*Cervus canadensis*	0	0	#129, Non-herd Unit
Mule Deer	*Odocoileus hemionus*	14,981	21,106	Pumpkin Buttes
Pronghorn Antelope	*Antelocapra americana*	13,430	22,613	Pumpkin Buttes
White-Tailed Deer	*Odocoileus virginianus*	0	0	Powder River

[1] Seasonal ranges and herd units were obtained from the BLM BFO GIS Database (BLM 2012b).

Pronghorn in the area are in the Pumpkin Buttes pronghorn antelope herd unit (PR309), which includes pronghorn hunt area 23. This herd is at or above objective population size since 1999, when favorable environmental conditions allowed the population to increase (WGFD 2011). Despite subsequent periods of poor habitat conditions caused by droughts and blizzards, population growth continued with the herd exceeding its 2011 post-season objective of 18,000 individuals by 46%. Access limitations from private land ownership and CBNG development in this herd unit limit hunting opportunities, reducing the potential to achieve adequate harvest.

Mule deer in the area in the Pumpkin Buttes mule deer herd unit (MD320), which includes mule deer hunt areas 19, 20, 29, and 31. This herd was 13%below its objective of 11,000 individuals in 2011, the lowest population since 1994 (WGFD 2011). The herd exceeded its population objectives from 2002 to 2010, but began to decline in 2006. This trend corresponds with recent studies showing that mule deer populations are experiencing a decline in overall numbers and herd size in Wyoming due to various factors – including minimizing habitat use near mineral developments (Sawyer et al. 2009). Mule deer avoidance around well pads and associated facilities was found to increase commensurate with the level of human activity in the area, while unmanned well pads were avoided the least by comparison. Similarly, mule deer avoid roadways with moderate levels of traffic, and showed an increased presence along roads with low to no use. Contrary to this trend, the mule deer residing in the Pumpkin Buttes herd unit was expected to increase slightly in 2012 due to favorable weather conditions, conservative hunting seasons, and limited hunter access (WGFD 2011).

The project area is overlapped by the Powder River White-tailed Deer herd unit (WT3030), which encompasses a large portion of north-central Wyoming. This herd exceeded its population objective of 8,000 individuals by 108% in 2011. The minimally managed elk Non-herd Unit (EL129), covers the CCE area, spreading from northern Natrona County to the borders of Montana and South Dakota.

3.8.2. Raptor Species

Most raptor species nest in a variety of habitats including, but not limited to, native and non-native grasslands, agricultural lands, live and dead trees, cliff faces, rock outcrops, and tree cavities. Suitable nesting habitat is present throughout the project area. Based on the BFO raptor database, multiple raptor nest sites exist throughout the project area (see Map 6) (BLM 2012b). Additionally, individual inventories were done on a case-by-case basis in response to both past and present activities proposed by operators, but these inventories were generally limited to an inventory of historic nests located within a one-half mile radius of each proposed federal action, or within a 1-mile radius for eagle nests.

Common raptors which may occur in the CCE area include the northern harrier (*Circus cyaneus*), golden eagle (*Aquila chrysaetos*), red-tailed hawk (*Buteo jamaicensis*), Swainson's hawk (*Buteo swainsoni*), ferruginous hawk (*Buteo regalis*), American kestrel (*Falco sparverius*), prairie falcon (*Falco mexicanus*), short-eared owl (*Asio flammeus*), and great horned owl (*Bubo virginianus*). Less common raptors in the project area include: osprey (*Pandion haliaetus*), bald eagle (*Haliaeetus leucocephalus*), rough legged hawk (*Buteo lagopus*), merlin (*Falco columbarius*), and burrowing owl (*Athene cunicularia*). Several of these species (osprey, bald eagle, ferruginous hawk, merlin, and burrowing owl) are special status (sensitive) species discussed in the subsection on Threatened, Endangered, and Special Status (Sensitive) Species. The PRB FEIS discussed raptors and their habit, pp. 3-141 to 3-148.

3.8.3. Migratory Bird Species

The Migratory Bird Treaty Act (MBTA) provides for the protection of migratory birds. Unless permitted by regulations, the MBTA makes it unlawful to pursue, hunt, kill, capture, possess, buy, sell, purchase, or barter any migratory bird, including the feathers or other parts, nests, eggs, or migratory bird products. In addition to the MBTA, Executive Order 13186 sets forth the responsibilities of federal agencies to implement MBTA provisions by integrating bird conservation principles and practices in agency activities and by ensuring that federal actions evaluate the effects of actions and agency plans on migratory birds.
Migratory birds are birds that migrate for breeding and foraging at some point in the year. The BLM-USFWS MOU (2010) promotes the conservation of migratory birds, complying with EO 13186 (Federal Register V. 66, No. 11). BLM must include migratory birds in every NEPA analysis of actions that have potential to affect migratory bird species of concern to fulfill obligations under the MBTA. BLM encourages voluntary design features and conservation measures supporting migratory bird conservation, in addition to appropriate restrictions.

The PRB FEIS provides additional information for migratory birds potentially occurring in the CCE area, pp. 3-150 to 3-153. Many migratory birds may use the project area at some time in the year. Many species use the CCE area's shrub-steppe and shortgrass prairie vegetation for their primary breeding habitat (Saab and Rich 1997). Species that may occur in these vegetation types are found in Table , grouped by a level identified in the Wyoming Bird Conservation Plan. Nationally grassland and shrubland birds declined more consistently than any other ecological association of birds over the last 30 years, WGFD 2010. The WGFD Wyoming Bird Conservation Plan (Nicholoff 2003) identified 3 groups of high-priority bird species in Wyoming: Level I – those that clearly need conservation action; Level II – species where the focus is on monitoring, rather than active conservation; and Level III – species that are not a high priority but are of local interest. Several migratory species are also BLM special status (sensitive) species. Those suspected as occurring in the CCE area are: Baird's sparrow (*Ammodramus bairdii*), Brewer's sparrow (*Spizella breweri*), loggerhead shrike (*Lanius ludovicianus*), long-billed curlew (*Numenius americana*), sage sparrow (*Amphispiza belli*), and sage thrasher (*Oreoscoptes montanus*).

Most of the birds in Table typically nest either on the ground or in shrubs. No breeding bird survey routes are in the project area. Yet the Schoonover (92043) route is north of CCE; and the Sussex (92064) route is south of CCE. A total of 11,790 individuals representing 64 species were identified on the Schoonover route on 16 breeding bird surveys between 1982 and 2001. Fourteen surveys on the Sussex route between 1991 and 2011 identified a total of 10,038 individuals representing 76 species. The western meadowlark, lark bunting, and cliff swallow were the 3 most abundant species observed on both survey routes. Table includes the most recent observation year and number of individuals identified for priority species seen on the Schoonover and Sussex routes.

Concerns regarding the decline of both migratory and non-migratory bird populations both locally and on a continental scale resulted in a nationwide bird conservation planning effort. Bird conservation plans prepared by states and regions include objectives for bird conservation. As shown by EO 13186, there is national direction to implement actions incorporating these goals. Management goals and objectives for bird conservation are found in the following documents:

- BLM WY Instruction Memorandum WY-IM-2013-005
- USFS Landbird Strategic Plan (USFS 2000);
- Presidential Executive Order (EO) 13186 dated January 10, 2001; and
- Memorandum of Understanding between the USDI BLM and USFWS to promote the conservation of migratory birds dated April 12, 2010.

Table 3-11. Partners In Flight Priority Bird Species Potentially Found in the Project Area

Common Name	Scientific Name	Habitat Type[1]	Wyoming BLM Sensitive	Breeding Bird Survey Year (# of individuals)[2]	
Level I Species (Conservation Action)				***Sussex***	***Schoonover***
Ferruginous Hawk	*Buteo regalis*	SS/SGP	Yes	1993 (1)	2011 (1)
Greater Sage-Grouse	*Centrocercus urophasianus*	SS	Yes	2000 (1)	2006 (1)
Long-billed Curlew	*Numenius Americana*	SGP	Yes	N/A	2006 (2)
Baird's Sparrow	*Ammodramus bairdii*	SGP	Yes	N/A	N/A
Brewer's Sparrow	*Spizella breweri*	SS	Yes	2001 (36)	2011 (5)
Sage Sparrow	*Amphispiza belli*	SS	Yes	N/A	1998 (2)
McCown's Longspur	*Calcarius mccownii*	SS/SGP	No	N/A	N/A
Level II Species (Monitoring)					
Loggerhead Shrike	*Lanius ludovicianus*	SS	Yes	2001 (2)	2011 (3)
Sage Thrasher	*Oreoscoptes montanus*	SS	Yes	2001 (4)	2007 (1)
Vesper Sparrow	*Pooecetes gramineus*	SS	No	2001 (4)	2011 (3)
Lark Sparrow	*Chondestes grammacus*	SS	No	2001 (10)	2011 (6)
Lark Bunting	*Calamospiza melanocorys*	SGP	No	2001 (56)	2011 (110)
Level III Species (Local Interest)					
Common Poorwill	*Phalaenoptilus nuttallii*	SS	No	N/A	N/A
Say's Phoebe	*Sayornis saya*	SS	No	2001 (4)	2011(3)

Source: USGS 2012; Nicholoff 2003

[1] Key:SS Shrub-steppe; SGP Shortgrass prairie

[2] The Sussex and Schoonover breeding bird survey routes are the closest survey routes to the project area. Breeding bird survey data was obtained from USGS 2012.

3.8.4. Federally Threatened, Endangered, and Candidate Species

An endangered animal species is a species listed under the Endangered Species Act of 1973 (ESA) as being in danger of extinction throughout all or a portion of its range. A threatened animal species is a species listed under the ESA as likely to become endangered in the foreseeable future throughout all or a portion of its range. Special status (sensitive) species (SSS) are species that are candidates to list pursuant to the ESA, or SSS designated by the BLM and the State of Wyoming. Per the ESA, a project's lead agency, in coordination with the USFWS, must ensure that a federal action authorized, funded, or implemented would not adversely affect a federally listed threatened or endangered species or its critical habitat. The BLM policy in Manual 6840 - Special Status Species Management requires the BLM to manage and protect any USFWS candidate species, state SSS, or State of Wyoming species of concern to prevent the need for future federal listing as threatened or endangered. The BLM BFO receives a species list periodically from the USFWS of threatened, endangered and candidate species. Table lists federally listed and candidate species potentially occurring in the CCE area.

Table 3-12. Endangered, Threatened, or Candidate Species' Habitats in the Project Area

Species Name	Designation	Habitat Type	Habitat Present in Project Area
Ute Ladies'-Tresses Orchid	Threatened	Moist meadows associated with perennial stream terraces, floodplains, and oxbows at elevations between 4,300-6,850 feet.	Yes
Greater Sage-grouse	Candidate	Foothills, plains, and mountain slopes with sagebrush present, often with a mix of sagebrush, meadows, and aspen, in proximity.	Yes

Source: USFWS 2012

3.8.4.1. Greater Sage-Grouse (GSG)

The PRB FEIS has a detailed discussion on GSG ecology and habitat, pp. 3-194 to 3-199. Subsequently the USFWS determined the Greater Sage-Grouse (GSG) warrants federal listing as threatened across its range, but precluded listing due to other higher priority listing actions, 75 Fed. Reg. 13910 to 14014, Mar. 23, 2010; 75 Fed. Reg. 69222 to 69294, Nov. 10, 2010. GSG are a WY BLM special status (sensitive) species (SSS) and a WGFD species of greatest conservation need because of population decline and ongoing habitat loss. The 2012 population viability analysis for the Northeast Wyoming GSG found there remains a viable population of GSG in the PRB, Taylor et al. 2012. However, threats from energy development and West Nile Virus are impacting future viability, Taylor et al. 2012. The BLM IM WY-2012-019 establishes interim management policies for proposed activities on BLM-administered lands, including federal mineral estate, until RMP updates are complete.

Sparse to moderately dense stands of sagebrush with mixed grasses and forbs are present in the CCE area, which provide areas of suitable GSG habitat. The CCE area is not in GSG core habitat areas; however, current GSG mapping identifies 2 non-core leks in the project area and 7 other non-core leks within 4 miles of the CCE boundary (see Map 6). In its *Recommendations for Development of Oil and Gas Resources within Important Wildlife Habitats* (WGFD 2010), WGFD categorized impacts to GSG by number of well pad locations per square mile within 2 miles of a lek and within identified nesting/brood-rearing habitats greater than 2 miles from a lek.

According to the WGFD guidance for non-core leks, moderate impacts occur to when well density is between 1 and 2 well pad locations per square mile or where there is less than 20 acres of disturbance per square mile; high impacts occur when well density is between 2 and 3 well pad locations per square mile or when there are between 20 and 60 acres of disturbance per square mile; and extreme impacts occur when well density exceeds 3 well pad locations per square mile or when there are greater than 60 acres of disturbance per square mile. The WGFD-defined category of impact for these 9 identified leks is provided in Table . There are currently 1,750 permitted and producing oil and gas wells in a 4-mile buffer from leks that are within 4 miles from the CCE boundary. This corresponds to a well density of approximately 6.9 wells per mile, above the 1 well per square mile recommendation made by the State Wildlife Agencies' Ad Hoc Committee for Consideration of Oil and Gas Development Effects to Nesting Habitat (State Wildlife Agencies' Ad Hoc Committee 2008).

Table 3-13. WGFD Category of Impact for Greater Sage-Grouse Leks in the Project Area

Lek Name[1]	Number of Permitted and Producing Wells[1]		Density of Permitted Producing Wells (wells per square mile)		WGFD Category of Impact
	2-mile buffer	*4-mile buffer*	*2-mile buffer*	*4-mile buffer*	
Christensen Ranch 3	79	313	6.28	6.23	extreme
Christensen Ranch 4[2]	69	344	5.49	6.84	extreme
Christensen Ranch 5	46	257	3.66	5.11	extreme
County Line	91	371	7.24	7.38	extreme
County Line N.	89	381	7.08	7.58	extreme
Irigaray II	45	293	3.58	5.83	extreme
North Butte	66	312	5.25	6.21	extreme
Pumpkin Creek II[2]	112	397	8.91	7.90	extreme
Willow Creek	101	356	8.04	7.08	extreme

[1] Lek locations obtained from BLM 2012b. The locations of permitted and producing oil and gas wells were obtained from the WOGCC online database (WOGCC 2012b).
[2] Christensen Ranch 4 and Pumpkin Creek II Leks are in the project area; other leks are within 4 miles of the proposal boundary.

3.8.4.2. Ute Ladies'-Tresses Orchid (ULT)

The PRB FEIS discussed the affected environment for ULT, p. 3-175. The Ute ladies'-tresses orchid (ULT) is threatened under the ESA. There are 9 known occurrences of ULT since the Wyoming discovery of the plant in 1993. Discoveries range from less than 10 to over 2,000 plants (Heidel 2007). In Wyoming, ULT is found in Converse, Goshen, Laramie, and Niobrara Counties in the Antelope Creek, Horse Creek, and Niobrara River watersheds. A species distribution model (Fertig and Thurston 2003) predicted that undocumented ULT populations may be present in southern Campbell County and Johnson County; however, no occurrences were found there (Heidel 2007). The Wyoming Natural Diversity Database is currently revising the distribution model for ULT to reflect recent observation data and species knowledge (Anderson). In Wyoming, suitable habitat for ULT has low, flat floodplain terraces or abandoned oxbows in close proximity to small perennial streams or rivers, between elevations of 4,750 and 5,400 feet (Fertig 2000; Heidel 2007). Predictions of the ULT distribution model and the presence of a limited acreage of riparian habitat suggest a slight possibility that undocumented ULT populations could exist in the project area; however, presence of the species is unlikely given the limited area of potential habitat, the rarity of the species, and the negative results of at least 15 prior surveys conducted in Campbell and Johnson counties between 1995 and 2006 (as documented in Heidel 2007, Table 1).

3.8.5. BLM Special Status (Sensitive) Species (SSS)

The PRB FEIS analyzed SSS and their habitats which may occur in the project area; PRB FEIS, pp. 3-174 to 3-201. A BLM SSS must meet the following criteria to be considered for SSS listing (BLM 2008):

- They must be native species found on BLM-administrated lands for which BLM has the capability to significantly affect the conservation status of the species through management.
- Information is available that a species has recently undergone, is undergoing, or is predicted to undergo a downward trend such that the viability of the species or a distinct population segment of the species is at risk across all or a significant portion of the species range.
- The species depends on ecological refugia or specialized or unique habitats on BLM-administrated lands, and there is evidence that such areas are threatened with alteration such that the continued viability of the species in that area would be at risk.
- All federally designated candidate species, proposed species, and delisted species in the 5 years following their delisting shall be conserved as Bureau SSS.

When BLM declares a species as a SSS, it is the BLM's obligation to determine its distribution and manage the species' habitat. Table 3-14 lists all SSS identified by the Wyoming BLM and whether they could occur in the project area based on their habitat preferences. The table also includes a brief description of the habitat requirements for each species. Wyoming BLM annually updates its list of SSS to focus management to maintain habitats to preclude listing as a threatened or endangered species. While presence or absence of these species in the general project area cannot be definitely established based on existing data, 14 of these sensitive species are more likely to occur in the project area than the remaining species based upon both prior observations and a review of habitat types therein.

Table 3-14. Wyoming BLM Special Status Sensitive Species and Habitat Preferences

Common Name	Scientific Name	Preferred Habitat	May Occur[1]
MAMMALS			
Bat, Townsend's Big-eared	*Corynorhinus townsendii*	Forests, basin-prairie shrub, caves and mines	Y
Prairie Dog, Black-tailed	*Cynomys ludovicianus*	Short-grass prairie	Y
Bat, Spotted	*Euderma maculatum*	Cliffs over perennial water, basin-prairie shrub	N
Myotis, Long-eared	*Myotis evotis*	Conifer and deciduous forests, caves and mines	Y
Myotis, Fringed	*Myotis thysanodes*	Conifer forests, woodland-chaparral, and caves	Y
Fox, Swift	*Vulpes velox*	Grasslands	Y
BIRDS			
Goshawk, Northern	*Accipiter gentilis*	Conifer and deciduous forests	N
Sparrow, Baird's	*Ammodramus bairdii*	Grasslands, weedy fields	Y

Table 3-14. Wyoming BLM Special Status Sensitive Species and Habitat Preferences

Common Name	Scientific Name	Preferred Habitat	May Occur[1]
Sparrow, Sage	*Amphispiza belli*	Basin-prairie shrub, mountain-foothill shrub	Y
Owl, Burrowing	*Athene cunicularia*	Grasslands, basin-prairie shrub	Y
Hawk, Ferruginous	*Buteo regalis*	Basin-prairie shrub, grassland, rock outcrops	Y
Sage-Grouse, Greater (see the Federally Threatened, Endangered, and Candidate Species Section)			
Plover, Mountain	*Charadrius montanus*	Short-grass & mixed-grass prairie, openings in shrub ecosystems, prairie dog towns	Y
Cuckoo, Yellow-billed	*Coccyzus americanus*	Open woodlands, streamside willows and alders	Y
Swan, Trumpeter	*Cygnus buccinator*	Lakes, ponds, rivers	N
Falcon, Peregrine	*Falco peregrinus*	Tall cliffs	N
Eagle, Bald	*Haliaeetus leucocephalus*	Primarily along rivers, streams, and lakes	Y
Shrike, Loggerhead	*Lanius ludovicianus*	Basin-prairie shrub, mountain-foothill shrub	Y
Curlew, Long-billed	*Numenius americanus*	Grasslands, plains, foothills, wet meadows	Y
Thrasher, Sage	*Oreoscoptes montanus*	Basin-prairie shrub, mountain-foothill shrub	Y
Ibis, White-faced	*Plegadis chihi*	Marshes, wet meadows	N
Sparrow, Brewer's	*Spizella breweri*	Basin-prairie shrub	Y
AMPHIBIANS			
Frog, Northern Leopard	*Rana pipiens*	Beaver ponds, permanent water	Y
Frog, Columbia Spotted	*Rana luteiventris*	Ponds, sloughs, small streams	N
PLANTS			
Porter's Sagebrush	*Artemisia porteri*	Sparsely vegetated badlands of ashy or tufaceous mudstone & clay slopes 5,300-6,500'	Y
Williams' Wafer-Parsnip	*Cymopterus williamsii*	Open ridgetops & upper slopes with exposed limestone outcrops or rockslides 6,000-8,300'	N
Limber Pine	*Pinus flexilis*	Timberline and lower with sagebrush. Associated with other pines, Mountain Mahogany, & junipers	N

Source: BLM 2010a.
[1]Key: Y = May occur in or in the vicinity of the proposed project area based on habitat preference.
N = Not likely to occur in or in the vicinity of the proposed project area based on habitat.

3.9. Aquatics

The PRB FEIS analyzed aquatics and fisheries, pp. 3-153 to 3-166. The CCE area is in the Upper Powder watershed (HUC--10090202). No perennial waterways are in the CCE area, however, multiple ephemeral and secondary waterways including North Prong Willow Creek and Pumpkin Creek, which are tributaries to the Powder River are present. These waters are unlikely to contain fish. No perennial waters are adjacent to the potential water pipeline from Table Mountain. This EA will not further analyze aquatics.

3.10. Visual Resources

The majority of the CCE area (30,096 acres or 83%, is a Class IV Visual Resource Management (VRM) area. This rating defines an area where changes may subordinate the original composition and character of the basic elements of the landscape, but must reflect what could be a natural occurrence in the characteristic landscape (BLM 1984). The remaining 6,004 acres (17%) of the CCE area is in a Class III VRM area. Moderate changes to the character of the landscape are permissible in Class III areas, provided alterations partially retain the character of the existing landscape by repeating basic elements found in predominant natural features and do not dominate the view of the casual observer. Like the CCE area, the area adjacent to the potential pipeline from Table Mountain is VRM Class III and Class IV. The CCE area is setback from most public roads in this part of Campbell and Johnson Counties. Permanent above-the-ground structures (not subject to safety considerations) would be painted to blend with the natural color of the landscape using "Standard Environmental Colors." The VRM setting of the Pumpkin Buttes Traditional Cultural Property (PBTCP) continues as a BLM and Wyoming concern, see below.

3.11. Cultural Resources

During the approval process for an APD or other site-specific project development activities, APC will submit a site specific plan to BFO detailing all proposed activities. BFO will analyze the potential effects that such activities could have on cultural resources. Using information gathered through previous and new inventory data BLM will conduct site specific cultural resource analyses, gather additional information through consultation with state historical preservation offices (SHPOs), tribes, and other interested parties, as well as the public, make eligibility determinations, analyze the potential effects and make adverse effect determinations, and seek to resolve any adverse effects through consultation.

BLM's policy is the "…manager's first choice shall be to avoid National Register [of Historic Places (NRHP)] listed and eligible properties that would otherwise be affected by a proposed land use, if it is reasonable and feasible to do so." (BLM Manual 8140) The majority of oil and gas development can typically avoid impacts to historic properties (cultural resources listed on or eligible for listing on the NRHP). When a historic property cannot be avoided it may be mitigated, which typically results in data recovery through excavation.

Field inventories are typically not a component of programmatic analyses (such as this document) since the exact nature of surface disturbance is unknown. Although, there is existing data about the project area since it was inventoried in relation to CBNG development. To date, 280 survey reports were completed covering 28,691 acres, or approximately 80% of the total project area. These surveys identified 268 cultural sites, of which 31 were eligible for inclusion on the NRHP. Site types include lithic scatters, cairns, stone circle sites, historic homesteads, historic trash scatters.

The Pumpkin Buttes (48CA268) Traditional Cultural Property (PBTCP) is eligible for the NRHP for its association with significant historical events; with significant historic individuals; its ability to provide significant historic and prehistoric information; as a location associated with the traditional beliefs of numerous Native American groups about their cultural history; and as a location where Native American religious practitioners have historically gone to perform ceremonial activities in accordance with traditional cultural rules of practice. Although there is currently ongoing energy development in the vicinity, the site retains integrity of setting. BLM and the Wyoming SHPO signed *the Programmatic Agreement Regarding Mitigation of Adverse Effects to the Pumpkin Buttes Traditional Cultural Property from Anticipated Federal Minerals Development* (BLM and SHPO 2009) (PA) addressing mitigation of adverse effects to the PBTCP from anticipated federal minerals development. The PA addresses direct physical impacts to the PBTCP, and impacts to the setting within 2 miles of the PBTCP.

3.12. Paleontology

Fossils generally are scientifically noteworthy if they are unique, unusual, rare, diagnostically or stratigraphically important, or add to the existing body of knowledge in a specific area of science. Most paleontological resources occur in sedimentary rock formations. Although experienced paleontologists generally can predict which formations may contain fossils and what types of fossils may be found based on the age of the formation and its depositional environment, predicting the exact location where fossils may be found is not possible. The BLM uses the Potential Fossil Yield Classification (PFYC) system to classify the potential to discover or impact important paleontological resources. PFYC is based on the likelihood of geologic formations to contain important paleontological resources using a scale of 1 (very low potential) to 5 (very high potential). The PFYC is intended to help determine management and mitigation approaches for leasing and surface-disturbing activities. The potential for mitigation efforts is typically aimed at higher-potential formations (class 4 and 5).

The entire project area is in the Wasatch Formation. In recent years, the Wasatch Formation was downgraded to a Class 3a formation (geologic units with widely scattered scientifically significant fossils) in the PRB, but remains a Class 5 formation (highest rating) statewide.

3.13. Recreation

The general project area has of a mosaic of private, state, and BLM-administered lands. The project area does not contain special recreation management areas or developed recreational sites. There are no recreational opportunities that could be significantly adversely affected by the CCE proposal so BLM omits this resource issue in Section 4 of this EA.

3.14. Lands and Realty/Rights-of-Way

A query of the BLM Legacy Rehost System (LR2000) database through the Public All Systems Geo Report returned information on authorizations, mining claims, conveyance of land and mineral titles, and other case types occurring in the project area. The resulting Case Recordation (CR) report includes 206 total acres of authorized rights-of-way (ROW) cases, 194 total acres of authorized oil and gas cases, and 20 total acres of other authorized cases (BLM 2012a). Information retrieved from the LR2000 Mining Claim Recordation (MC) database revealed 4 active mining claims by Uranium One Inc. in Township 45 North, Range 76 West, constituting approximately 21 acres each in Sections 4, 33, and 34 (BLM 2012a). Oil and gas project proponents are required to consider valid existing rights, and no adverse impacts from leasable mineral projects like the proposed action are anticipated. BLM omits this resource issue from further analysis in Section 4 due to the remote chance of the potential of significant affects.

3.15. Transportation and Access

The existing transportation network in the CCE area has approximately 54 miles of roads providing access for ranch operations, CBNG, oil and gas wells, and facilities. The primary route to the project area is from Exit 125 on I-90 immediately west of Gillette, WY. This route proceeds south on WY 50 (also known as Skyline Drive) for approximately 25 miles before turning west onto Black and Yellow Road and proceeding in a southwesterly direction. Alternatively, the project area is accessable from the west via Streeter Road or via Bullwhacker Road. Travel in the CCE area is via existing and proposed access roads.

The Wyoming Department of Transportation (WYDOT) created “corridor visions” for 16 State Significant Corridors as a precursor to the development of specific corridor plans. In its corridor vision for State Significant Corridor 13, Sheridan to Sundance (I-90), WYDOT recognized the need to “maintain statewide transportation connections” and “accommodate growth in truck freight transport” to facilitate the transport of energy resources from Campbell County and the PRB (WYDOT No Date). To meet these goals, WYDOT proposed various strategies to improve safety, travel efficiency, and roadway conditions along State Significant Corridor 13. Planned improvements include the construction and rehabilitation of interchanges and bridges, enhancing intermodal freight connections, and the use of intelligent transportation systems technologies, such as variable message signs (WYDOT No Date).

Wyoming Highway 50 serves as an important regional corridor connecting the PRB with Interstate-90. In the Draft 2013 State Transportation Improvement Program, WYDOT identified one capital improvement project for the segment of Wyoming Highway 50 used to access the project area, consisting of 3 miles of lane reconstruction (WYDOT 2012b). WYDOT’s 2010 annual average daily traffic (AADT) estimates for Wyoming Highway 50 peak at 17,059 vehicles near its busy northern terminus at I-90, then decline rapidly outside of the Gillette corporate limits to just 1,473 vehicles at its junction with Black and Yellow Road to the south (WYDOT 2012a). The weighted average AADT for the entire segment of Wyoming Highway 50 used to access to the project area is 2,624 vehicles.

3.16. Range Management

3.16.1. Grazing Allotments

There are 21,346 acres of grazing allotments on surface estate in the project area that are managed by the BLM, state, and private owners. Based on a Field Office-wide average of 6 acres/Animal Unit Month (AUM), the project area contains approximately 3,500 AUMs. The acreage and ownership of grazing allotments in the project area are shown in Table 3-15.

Table 3-15. Grazing Allotments in the Project Area

Allotment Number	Allotment Name	Ownership (acres)			Total Acres in Project Area
		BLM	*State*	*Private*	
2380	Wormwood Ranch	2,998	320	271	3,589
12139	Falxa	5,210	1,594	4,193	10,997
12169	Hoe Ranch	768	0	2,009	2,777
12138	Pumpkin Creek	2,432	0	1,551	3,983
Total	**--**	**11,408**	**1,914**	**8,024**	**21,346**

Source: BLM 2012b.

3.16.2. Existing Range Improvements

Existing range improvements on non-federal lands in the CCE area generally include buried water pipelines, fences (pasture and/or boundary fences), reservoirs, stock tanks and water wells. There are 105 permitted water wells that were drilled and completed on lands in the project area that are designated for stock use (see Water Resources). Of these, only 6 are designated solely for stock use, with the majority of remaining wells representing CBNG production water also permitted for stock uses. The 6 wells designated exclusively for stock watering purposes have depths ranging from 4 to 500 feet, WSEO 2012.

3.17. Social and Economic Conditions

According to a report prepared by SWCA Consultants for the Western Energy Alliance, *Economic Impacts of Oil and Gas Development on Public Lands in the West*, the development and completion of a typical oil or gas well in Wyoming, based on 2010 data, is estimated to produce over $5 million in economic activity and provide over 17 annual job equivalents (AJEs), with an average labor income of $73,944 per AJE (Western Energy Alliance 2012). One AJE is equal to 12 months of part-or full-time employment. The same report identified the top 10 sectors likely to be affected by well development in Wyoming as oil and gas companies; food and beverage services; real estate; health practitioners; architectural and engineering services; securities, commodity contracts, and investments; wholesale trade businesses; truck transport services; retail stores; and legal services. Based on the data above, the 36 proposed wells could generate over $180 million dollars in economic activity over the life of the project, and provide 612 AJE.

4. ENVIRONMENTAL EFFECTS

This section describes the environmental effects of the no action alternative and the proposal. BLM discusses only resource issues with the potential for significant affects as analyzed through the CCE proposal. Resources unaffected, not affected beyond the level analyzed in the PRB FEIS, or unlikely to have the potential for significant affects are outside the scope of this analysis. Where possible BLM quantified effects; where BLM has difficulty quantifying effects, BLM provides a qualitative description with supporting rational. BLM provides where appropriate, separate discussions of direct and indirect, cumulative effects, mitigation measures, and residual effects. Appendix A includes a list of applicant committed measures (ACMs) that APC or operators would apply, as appropriate, to all potential activities under the CCE proposal. These measures, as well as the additional measures outlined in the well-specific surface use plans, future approved applications for permit to drill (if any), and the Integrated Weed and Pest Management Plan (Appendix B), would serve to reduce potential adverse impacts on resources from the proposal. The BLM may apply additional conditions of approval (COAs) or programmatic mitigation measures (Appendix D) before approving any development based on site-specific and other conditions.

4.1. Alternative A – The No Action Alternative

The no action alternative was analyzed as Alternative 3 in the PRB FEIS and subsequently received augmentation of the effects analysis in this EA through the analysis of mineral development projects, their approval, and construction; the analysis and approval of grazing allotments; and through the analysis and approval of other projects. BLM incorporates by reference these analyses in this EA; see Appendix C. The CCE area contains approximately 830 acres of surface disturbance from existing roads, well pads, and other oil and gas related facilities. Under the no action alternative, on-going well field operations would continue as would the development of 2 approved single and multi-well pads (approximately 25 acres of new disturbance) consisting of 4 horizontal wells with approved APDs and other approved APDs. Activities associated with production and the drilling and completion of these new wells would result in noise and human presence that could affect certain resources in the CCE area; these effects could include the disruption of wildlife, the dispersal of noxious and invasive weed species, and dust effects from unpaved road traffic. Present fluid mineral development in the PRB is under half of that envisioned and analyzed in the PRB FEIS. There is only a remote potential for significant effects above those identified in the PRB FEIS to resource issues as a result of implementing the no action alternative.

4.2. Alternative B – Proposed Action

4.2.1. Air Quality

4.2.1.1. Direct and Indirect Effects

Emissions from the CCE proposal would be a result from construction, drilling, and completion activities. Emissions during drilling and completion would result from surface disturbance by earth-moving equipment, fugitive dust from wind erosion at pad sites, well testing, as well as drilling rig and vehicle engine exhaust. Emissions from production (including well production equipment, booster, and pipeline compression engine exhaust) would occur from existing wells under the no action alternative and from the additional wells as part of the proposed action.

Design features of the CCE proposal should reduce air pollutant emissions. Operators will minimize non-particulate emissions by maintaining vehicles, rig engines, and generator, and screw compressors in proper operating condition. As a standard practice, APC will generally surface all new project roads with gravel; see Section 2. If fugitive dust problems are identified by the BLM due to travel on new or existing roads not surfaced with gravel, APC will apply appropriate dust suppression techniques. Abatement measures would include the application of water or chemical dust suppressants to disturbed surfaces, and would be initiated in consultation with the BLM and WDEQ to avoid exceeding ambient air quality standards. Magnesium chloride may be used in accordance with state or BLM COAs, or upon the request of the county or landowner. Using abatement measures the project area during periods of heavy vehicle traffic vehicle could reduce fugitive dust (PM_{10}) by 50% or more, BLM 2003. BLM anticipates that dust emissions from vehicle traffic on roads in the CCE area may be minimal as a result of these measures, and therefore were not estimated for this analysis – though is remains a potential gap in knowledge.

Pollutant emissions during construction, drilling, and completion would include NO_x, CO, SO_2, PM_{10}, and VOCs. These emissions would be temporary, short-term, in nature and would occur in isolation at each proposed well. Maximum air pollutant emissions from each exploratory well should be temporary, should occur in isolation, and should not significantly interact with adjacent well locations (the standard spacing for horizontal wells in the State of Wyoming is 1 well per 640 acres). Temporary construction emission that occur during well pad construction, well drilling, and well completion testing are estimated in Table 4-1, below, and are developed from available emission factors, analytical data, anticipated activity, and equipment specifications from APC's experience with similar activities in other locations. Because these emissions are temporary, PSD increments are likely inapplicable. Unlike pad construction and drilling/completion activities that involve standard practices and equipment that can be used to calculate emissions from a proposed action, emissions from production activities largely depend on the amount of production from each well. In fields where the operator has experience producing from the underlying formation with a given technology, it is often possible to develop more precise assumptions about the production from new wells. However, in the project area, there is limited production data for horizontal wells, making it more difficult to estimate air emissions from the production phase. Data used to calculate the yearly per well emissions for pollutants shown in Table 4-2 are from APC exploratory wells near the PRB. Because these exploratory wells were in production for a limited time, BLM and APC were unable to determine precise production curves for wells in the proposed action. The average production decline curve was estimated using data from similar wells in other APC-operated areas. Emissions presented in Table 4-2 include well production activities associated with heater treaters, controlled oil flashing, working and breathing losses, fugitives, and truck loading.

BLM anticipates no violations to the NAAQS from implementation of the CCE proposal. Based on information provided herein, localized, short-term, increases in NO_x, CO, VOCs, and PM_{10} concentrations would occur, but maximum concentrations should likely be well below applicable state and federal criteria – though this remains a knowledge gap. Air pollutants in the vicinity should return to background levels at the end of production and may be de minimis during the production phase – though this remains a knowledge gap. See the Air Quality Cumulative Effects section below for a discussion of the potential cumulative effects of the proposed action.

Table 4-1. Per Well Criteria Pollutant Emissions Estimate for a Typical Well in the Crazy Cat East Project Area – Pad Construction and Drilling/Completion Phases

	Emissions (cumulative tons over the project component)				
Project Component	**NO_x**	**CO**	**SO_2**	**PM_{10}**	**VOC**
Pad Construction[1]	2.33	2.87	0.00	0.13	0.34
Drilling & Completion[1]	3.13	1.88	0.59	0.11	0.63
Total	**5.94**	**5.1**	**0.59**	**0.59**	**1.01**

Source: ICF 2012

[1]Emssions from Pad Construction activities would occur only once for pads with multiple wellbores.

Table 4-2. Yearly Criteria Pollutant Per Well Emissions Estimate for a Typical Well in the Crazy Cat East Project Area– Production Phase[1]

Year	Production Decline[2]	Emissions (tons)[3]				
		NO_x	**CO**	**SO_2**	**PM_{10}**	**VOC**
1	0	0.3	0.2	0.0	0.1	8.1
2	50	0.1	0.1	0.0	0.0	4.0
3	15	0.1	0.1	0.0	0.0	3.4
4	15	0.1	0.1	0.0	0.0	2.9
5	15	0.1	0.1	0.0	0.0	2.5

Source: ICF 2012

[1] Emissions information based on average production from APC exploratory wells near the Powder River Basin

[2] Precise production curves for wells in the project area are unknown, and were therefore assumed based on a production decline curve for similar well types in other APC-operated areas.

[3] Emissions include well production activities associated with heater treaters, controlled oil flashing, working and breathing losses, fugitives, and truck loading.

4.2.1.2. Cumulative Effects

BFO assessed cumulative air quality impacts for the portion of the PRB in the BFO's management area. The PRB FEIS discusses the cumulative effects to air quality, pp. 4-386 to 4-392. For each alternative, potential air pollutant project sources were combined with non-project sources, including sources from the Montana Statewide Oil and Gas EIS, to determine the total potential cumulative air quality impacts. The analysis in the PRB FEIS compared potential air quality impacts from the proposed alternatives to applicable ambient air quality standards and PSD increments, but comparisons to the PSD Class I and II increments were intended to evaluate a threshold of concern for potential impacts, and did not represent a regulatory PSD Increment Consumption Analysis.

Under all 4 alternatives in the PRB FEIS, impacts include potential exceedences of PSD Class I increments for NO_X and PM_{10} in the Northern Cheyenne Reservation. Under Alternatives 1, 2A, and 2B, cumulative 24-hour PM_{10} concentrations would exceed the PSD Class I increment in the Washakie Wilderness. Under all 4 alternatives, acid neutralizing capacity impacts in Upper Frozen Lake in the Bridger Wilderness Area were predicted to exceed the impact threshold from non-project sources alone, with an additional 12 to 27% of impacts from contributions under the various Alternatives analyzed.

Under Alternatives 1 and 2A cumulative acid neutralizing capacity impacts were predicted to exceed the impact threshold at Florence Lake in the Cloud Peak Wilderness Area. Potential impacts at all other sensitive lakes (and under all alternatives considered) were below the acid neutralizing capacity threshold levels. The PRB FEIS also identified cumulative visibility impacts (increased regional haze) resulting from project and non-project sources as a concern, indicating that several PSD Class I areas would be subject to perceptible visibility impacts for a number of days out of each year. The CCE proposal would contribute to these cumulative impacts described in the PRB FEIS. The *Update of the Task 3A Report for the Powder River Basin Coal Review Cumulative Air Quality Effects for 2020* also evaluated the air quality-related environmental impacts of ongoing development in the region, to which the proposed action would contribute.

4.2.1.3. Mitigation Measures

In order to establish “baseline” air quality in the area, monitor changes, and mitigate potential impacts, the operator will coordinate with the BLM to install a mobile air quality monitoring station at an approved location proximate to the CCE development area. The station will continuously monitor the primary pollutants, as listed above. Data will be reviewed quarterly for statistically significant trends. APC will submit proposed mitigation to reduce pollutant trends via sundry notice. Potential mitigation actions could include:

a. Increase frequency for water application to transportation system in the area;
b. Chemical dust control (MagChloride, etc.) on active access roads;
c. Installation of vapor recovery units on all storage facilities and treatment equipment;
d. Elimination of flaring or venting by installation of a gas gathering system;
e. To reduce the volume of truck traffic during stimulation activities, all water used for completion will be piped to from the source to location in temporary surface or permanent buried water lines.

BLM will analyze the site-specific proposal, its design features, and its operator committed measures. BLM, with the operator as much as possible, will determine which if any of the programmatic mitigation measures to apply from the PRB FEIS ROD, from this EA’s Appendix D, or whether to consider the application of other mitigation measures supported by further specific analysis.

4.2.1.4. Residual Effects

The residual temporary air quality decrements that escape treatment through design features and mitigation measures will be brief due to the mixing action of the strong, consistent regional winds remixing the atmosphere. BLM anticipates no residual effect of any mid to long term effect on the PRB region’s air quality.

4.2.2. Soils, Vegetation, and Ecological Sites

4.2.2.1. Soils

4.2.2.1.1. Direct and Indirect Effects

The CCE proposal may result in approximately 630 acres of new soil disturbance in the project area and offsite ROW in the short term (i.e., during construction, drilling, and completion). Topsoil excavated from all disturbed areas would be salvaged, stockpiled, have its microbiological viability maintained, and returned to graded surfaces as an integral part of the construction of all project elements, thereby reducing the impacts to soil productivity status. Well pads and associated facility disturbances would be re-graded to match existing topography and revegetated following project termination. As soon as practicable after the initial disturbance, areas not need for production would be reclaimed, resulting in a post-reclamation area of new disturbance of approximately 141 acres. The majority of the existing oil and gas wells operated by APC in the project area have successfully met the WDEQ Large Construction General Permit revegetation standards[3], which require that construction projects disturbing 5 or more acres be revegetated with perennial vegetation to a uniform 70% of natural background cover (Map 8).

Impacts anticipated to occur from the proposed action include soil rutting and mixing, compaction, increased erosion potential, and loss of soil productivity. The most notable impacts would occur in association with the construction of well pads, staging areas, and roads. Construction of these facilities requires grading and leveling, with the greatest level of effort required on more steeply sloping areas. Construction activities mix the soil profiles with a corresponding loss of soil structure. Mixing may result in removal, dilution, or relocation of organic matter and nutrients to depths where it would be unavailable for vegetative use. Less desirable inorganic compounds such as carbonates, salts, or weathered materials could be relocated and affect revegetation. Compaction of soils results from the construction of wells and associated facilities, continued vehicle and foot traffic, as well as operational activities. Factors affecting compaction include soil texture, moisture, organic matter, clay content and type, pressure exerted, and the number of passes by vehicle traffic or machinery. Compaction leads to a loss of soil structure; decreased infiltration, permeability, and soil aeration; as well as increased runoff and erosion.

Increased erosion can lead to a decrease in soil fertility and an increase in sedimentation. The duration and intensity of these impacts would vary according to the type of construction activity to be completed and the inherent characteristics of the soils to be impacted. The potential for erosion would increase through the loss of vegetation cover and soil structure as compared to an undisturbed state. Soil productivity would decrease, primarily as a result of profile mixing and compaction along with the loss in vegetative cover. These impacts would begin immediately as the soils would be subjected to grading and construction activities and impacts would continue for the term of operations. The impacts on soils would move to a steady state as construction activities were completed and well production/maintenance operations begin. Rutting affects the surface hydrology of a site as well as the rooting environment. The process of rutting physically severs roots, thus reducing soil aeration and infiltration thereby degrading the rooting environment. Rutting may result in topsoil and subsoil mixing, thereby reducing soil productivity. Rutting also disrupts natural surface water hydrology by diverting and concentrating water flow, thus accelerating erosion. Soil mixing typically results in a decrease in soil fertility and a disruption of soil structure.

4.2.2.1.2. Soils Susceptible to Erosion

The CCE area has 3,008 acres of soils with severe water erosion potential and 779 acres with severe wind erosion potential. The rate of erosion would be site dependent, and would be influenced by the soil characteristic, slope, and the amount and type of vegetation. The development of well pads and facilities on erosive soils would result in the loss of vegetation and biologic soils crusts, as well as a decrease in soil organic matter content and productivity. Effects to soils susceptible to water erosion include steep sites with slopes in excess of 25% and traveled slopes equal to or greater than 8% slopes; see Section 3 and below. Effects to soils susceptible to wind erosion include sandy ecological sites; see Section 3.

4.2.2.1.3. Limited Reclamation Potential

Badlands components are associated with the Shingle-Taluce-Badland and the Samday-Shingle-Badland complexes, which together comprise approximately 3% of the CCE area. Badlands are approximately 15% of each of these 2 soil complexes and cover approximately 324 acres (less than 1%) of the project area; see Section 3. If disturbance in any of these existing LRP areas occurs, APC will implement

[3] WDEQ Large Construction General Permit revegetation standards are wholly independent from the Wyoming BLM Reclamation Policy outlined in Instructional Memorandum No. WY-2012-032.

appropriate measures, in coordination with the BLM and/or private surface owners, to minimize impacts to soils and maintain soil productivity potential to the extent practicable. BLM will consider applying a 30-day stabilization requirement to wells and access/pipelines that were not moved away from or off of slopes in excess of 25%. The CCE proposal, like any large construction project, has the potential to create new LRP areas. Several of the ACMs in Appendix A would help to limit the creation of new LRP areas, including: the salvage, reapplication, and seeding of topsoil from the project site, the potential addition of soil amendments (where warranted based on testing) to increase the success of revegetation, and the use of water bars on all reclaimed pipeline corridors to limit active erosion.

4.2.2.1.4. Slopes in Excess of 25 Percent

CCE areas with slopes exceeding 25% cover approximately 5% of the proposal. Since the specific locations of the proposed wells and access roads are undefined, the potential disturbance of highly sloped areas is unquantifiable, but would be evaluated during APD review. If steeply sloped areas were disturbed, APC would implement appropriate measures, in coordination with the BLM and/or private surface owners, to minimize impacts to soils and maintain soil productivity potential to the extent practicable, as described in the ACMs in Appendix A. These ACMs include the use of erosion control fabric, BLM would consider applying a 30-day stabilization requirement to wells and access roads and pipelines that are not moved away from or off of slopes in excess of 25%.

4.2.2.1.5. Poor Reclamation Suitability

The project area contains 25,042 acres of soils with poor reclamation suitability (approximately 69% of the project area) (see Map 3 and refer to Section 3 for additional information). If disturbance of these areas occurs, APC would implement appropriate measures, in coordination with the BLM and/or private surface owners, to minimize impacts to soils and maintain soil productivity potential to the extent practicable. These measures would include topsoil salvage and reapplication and the potential use of soil amendments.

4.2.2.1.6. Cumulative Effects

Refer to the PRB FEIS, pp. 4-151 to 4-152 for details on expected cumulative impacts to soils. The PRB FEIS defines the designation of the duration of disturbance, pp. 4-1 and 4-151. Most soil disturbances would be short term impacts with expedient interim reclamation and site stabilization. In the case of this project, 489 acres (78%) of the initial disturbance from the proposed action would be reclaimed as soon as practicable. APC's use of horizontal wells will result in approximately 1,800 fewer acres of disturbance than if the area were developed using single, vertical oil and gas wells. The existing CBNG wells in the project area will likely be plugged and abandoned over the 40 life of the CCE project. As these CBNG wells time out, and because of the ability of a single horizontal well to extract oil and gas from an area that would normally require multiple vertical wells, the amount of overall surface disturbance in the project area would likely decrease. The successful reclamation of 233 existing CBNG wells expected to time out over the life of the proposed action would result in 47 fewer acres of disturbance. Further reductions in overall disturbance would take place through the reclamation of associated roads, facilities, and other infrastructure no longer needed after well abandonment. See Section 2 for graphical illustrations of the anticipated long term versus short term facilities in the project area.

4.2.2.1.7. Mitigation Measures

BLM will analyze the site-specific proposal, its design features, and its operator committed measures. BLM, with the operator, will determine which if any of the programmatic mitigation measures to apply from the PRB FEIS ROD, from this EA's Appendix D, or whether to consider the application of other mitigation measures supported by further specific analysis. BLM will consider site specific mitigation mandating immediate treatment (at the stabilization phase or within 30days of surface disturbance) to reduce footholds of invasive or noxious weeds. Operators would follow the guidance in the Wyoming Policy on Reclamation (Instruction Memorandum WY-2012-032, http://www.blm.gov/style/medialib/blm/wy/programs/reclamation.Par.60413.File.dat/wy2012-032w-atch.pdf incorporated here by reference), which includes short-term reclamation goals of quickly stabilizing (through use of interim reclamation measures) disturbed areas to protect both disturbed and adjacent undisturbed areas from unnecessary degradation.

4.2.2.1.8. Residual Effects

Residual effects across the project area would include a long-term loss of soil productivity associated with well pads and roads. The PRB FEIS identified residual effects, p. 4-408, such as the loss of vegetative cover, despite expedient reclamation, for several years until reclamation is successfully established. Although this proposal will contribute to residual effects on soils and associated vegetative cover, the majority of the existing oil and gas wells operated by APC in the project area successfully met WDEQ Large Construction General Permit (LCGP) revegetation standards for interim reclamation (Map 8).

4.2.2.2. Vegetation and Ecological Sites

4.2.2.2.1. Direct and Indirect Effects

The PRB FEIS discusses most direct and indirect effects vegetation, pp. 4-153 to 4-164, including noxious weeds, pp. 4-158 to 4-162, and the direct and indirect effects to ecological sites, pp. 4-153 to 4-164. The proposed action would affect the common plant communities that occur on the site and the transition between the communities. Direct effects to vegetation would occur from surface disturbance caused by construction of well pads, compressor stations, ancillary facilities, associated pipelines, and roads. Other impacts anticipated to occur include those in the direct and indirect effects listed above under soils section. Short-term effects would occur where vegetated areas are disturbed, but later reclaimed within 1 to 3 years of the initial disturbance. APC would stabilize and reseed disturbed areas with mixes approved by BLM containing sterile cover crops with interim reclamation using native grasses and forbs to restore disturbed areas to properly functioning vegetation communities, with the exception of sage-brush, which is not in the current seed mixes. Long-term effects would occur where well pads, roads, or other semi-permanent facilities would result in loss of vegetation and prevent reclamation for the life of the well field, until these areas are reclaimed in accordance with BLM Wyoming Reclamation Policy (Instructional Memorandum No. WY-2012-032) and the WDEQ Large Construction General Permit revegetation standards. BLM reclamation goals emphasize eventual ecosystem reconstruction, which means returning the land to a condition approximate to an approved “Reference Site” or NRCS Ecological Site Transition State. Surface disturbance in sage brush areas could result in long-term effects to the ecological site, including altered vegetation composition and structure.

Indirect effects, as described in the PRB FEIS, would include the spread and/or establishment of noxious weeds, the alteration in surface water flows affecting vegetation communities, alteration in ecosystem biodiversity, and changes in wildlife habitat.

Direct effects to ecological sites would occur from ground disturbance caused by construction of well pads, associated pipelines, and roads. Sandy ecological sites may be very susceptible to wind and water erosion due to relatively low amounts of clay and little water holding capacity. Short-term effects would occur where vegetated areas are disturbed, but later reclaimed within 1 to 3 years of the initial disturbance. Long-term effects would occur where well pads, compressor stations, roads, or other semi-permanent facilities would result in loss of vegetation and prevent reclamation for the life of the project. Since the specific locations of the proposed wells and access roads are not yet defined, site-specific impacts to ecological sites cannot be determined at this time; where appropriate, these effects would be assessed at the time of APD submittal.

4.2.2.2.2. Cumulative Effects

The PRB FEIS discusses the cumulative effects to vegetation, pp. 4-164 to 4-172. Most surface disturbances would be short-term impacts related to construction activities that would be reclaimed through site stabilization and interim reclamation, as committed to by APC and as required by the BLM in COAs. The proposed action is planned in an area already affected by mineral development, which currently represents approximately 2% of the land surface, distributed over the project area. By comparison, the proposed project represents an additional 2% of surface disturbance within the project area. APC's use of horizontal wells would result in approximately 1,800 fewer acres of post-interim reclamation disturbance than if the area were developed using single, vertical oil and gas wells. Over the 40 year life of this proposal, the CBNG wells, given their life of 10-15 years, will likely be plugged and abandoned, thus decreasing long-term cumulative impacts to vegetation. As these CBNG wells time out, and because of the ability of a single horizontal well to extract oil and gas from an area that would normally require multiple vertical wells, the amount of overall surface disturbance in the project area would likely decrease. The successful reclamation of 233 existing CBNG wells expected to time out over the life of the proposed action would result in 47 fewer acres of disturbance. Further reductions in overall disturbance would take place through the reclamation of any associated roads, facilities, and other infrastructure no longer needed after well abandonment. See Section 2 for graphical illustrations of the anticipated long term versus short term facilities in the project area.

The PRB FEIS discusses the cumulative effects to ecological sites, pp. 4-153 to 4-172. Cumulative effects to ecological sites include the further alteration of disturbance regimes from the increased disturbance, increase in noxious weeds, and alterations in vegetation community's diversity and cover.

4.2.2.2.3. Mitigation Measures

BLM will analyze the site-specific proposal, its design features, and its operator committed measures. BLM, with the operator as much as possible, will determine which if any of the programmatic mitigation measures to apply from the PRB FEIS ROD, from this EA's Appendix D, or whether to consider the application of other mitigation measures supported by further specific analysis.

4.2.2.2.4. Residual Effects

The PRB FEIS, p. 4-408, identified residual effects such as the loss of vegetative cover, despite expedient reclamation, for several years until reclamation is successfully established. The alteration of biodiversity of ecological sites could result from disturbance, alterations in vegetation in reclaimed areas, and the spread and establishment of non-native invasive species.

4.2.3. Water Resources

4.2.3.1. Ground Water

4.2.3.1.1. Direct and Indirect Effects

Drilling and completion for each well would require 80,000 to 100,000 bbls of water. APC anticipates that water used in this project would be CBNG water from the Table Mountain field, and would be delivered via an underground pipeline to centralized tap before being piped or trucked to water tanks at each well pad. Private transactions may provide additional water sources – which the BLM will analyze via site-specific NEPA analysis. Effects to groundwater from CBNG development are addressed in the Table Mountain EA (BLM 2010c) and the PRB FEIS, pp. 4-12 to 4-69. As written in Section 3 the records of the Wyoming State Engineer (WSEO) revealed that 226 of the 237 permitted wells in the project area are associated with CBNG development.

The target zones for the proposal are the Mowry, Niobrara, Frontier, Sussex, and Shannon formations. Permitted non-CBNG water wells in the project area produce from depths that range from 4 feet above to 800 feet below ground surface (bgs), with a single well drilled to 7,200 feet (WSEO 2012). These wells are designated for stock, irrigation, and other miscellaneous uses. The proposed oil and gas wells would not draw water from the Fox Hills/Lance aquifer, and are not anticipated to result in any additional drawdown in wells near the project area.

APC would be required to select and implement appropriate water management actions to protect groundwater resources in compliance with all applicable state and federal regulations. As written in Section 2.2, a closed loop drilling mud system would prevent any shallow groundwater contamination. Adherence to the drilling ACMs in Appendix A and any additional COAs required by the BLM for individual wells, the setting of casing at appropriate depths, following safe remedial procedures in the event of casing failure, and using proper cementing procedures should protect ground water resources from contamination. Surface casing will be set and the wellbore will be cemented down to a depth below the deepest known fresh water aquifer and back up to the surface to ensure that groundwater would not be adversely affected by well drilling and completion operations. Since aquifer depths vary across the project area, exact surface casing depths will be determined at the time of APD submittal. Compliance with the drilling and completion plans and Onshore Oil and Gas Orders Nos. 2 and 7 would also avoid adverse impacts on groundwater.

Produced water should be of limited quantity and would be stored in tanks on site until being hauled to a permitted disposal facility. The expected produced water volume is uncertain; APC will have to produce the well(s) for a time to be able to estimate the volume and quantity of water production. To comply with Onshore Order Oil and Gas Order No. 7 Disposal of Produced Water, APC would submit a Sundry to the BLM within 90 days of first production, which would include a representative water analysis and the final proposal for water management. Fluids returned during the flow-back procedure would initially be captured in tanks on site. These recaptured fluids would then be transferred to 500 gallon trucks and disposed of by a professional service in accordance with both BLM and WOGCC rules and regulations. All flow-back fluids captured after 20 days would be considered produced water and would be disposed in existing commercial disposal wells. Under these circumstances, infiltration near surface discharge points or impoundments would not occur, saturation of near-surface alluvium would not occur, and operators will avoid groundwater quality issues related to produced-water recharge in underlying aquifers.

While APC is not currently surface discharging produced water from CBNG wells in the project area, APC would explore the reuse of other operators produced CBNG water in the drilling and/or completion of deep horizontal wells. As shown in Section 3 Leasable Oil and Gas, a number of potential sources of produced water exist in the project area. The reuse of this produce water, should it occur, could reduce the need to tap other, more distant, water sources for use in completions.

A 2004 Environmental Protection Agency (EPA) study found it unlikely that hydraulically fractured CBNG wells would contaminate ground water (EPA 2004). In addition, the EPA has a more expansive, on-going study looking at other aspects of hydraulic fracturing, but has yet to issue results or new guidance. As discussed in Section 3, the Fox Hills/Lance aquifer system, historically used for stock, domestic, and municipal water and, to limited extent, for irrigation, is the primary groundwater resource underlying the CCE area (HKM 2002; BLM 2006). Because all wellbores would be cased and cemented prior to well completion, in accordance with an approved APD and Onshore Oil and Gas Orders Nos. 2 and 7, to depths below the deepest known aquifer and back up to the surface, the potential for contamination of aquifers is minimal.

4.2.3.1.2. Cumulative Effects

Cumulative effects on groundwater resources include direct and indirect effects from the proposed action on aquifers underlying the project area, as described above, combined with the effects of existing and proposed development in the area. Produced water from the proposed wells may be of limited quantity and would generally originate from deeper formations in comparison to nearby CBNG wells; therefore, no measurable drawdown in the water level of nearby wells is anticipated to occur from the proposed action. As written in the PRB FEIS, “The aerial extent and magnitude of drawdown effects on coal zone aquifers and overlying and underlying sand units in the Wasatch Formation also would be limited by the discontinuous nature of the different coal zones within the Fort Union Formation and sandstone layers within the Wasatch Formation" (PRB FEIS, p. 4-64). Adhering to the drilling ACMs in Appendix A and any additional conditions of approval required by the BLM for individual wells, the setting of casing at appropriate depths, following safe remedial procedures in the event of casing failure, and using proper cementing procedures should protect fresh water aquifers above the drilling target zone, including the Fox Hills/Lance aquifer system, which serves as the primary fresh water resource underlying the project area. Refer to the PRB FEIS, pp. 4-64 to 4-69, for additional details on expected cumulative impacts.

4.2.3.1.3. Mitigation Measures

In order to reduce potential impacts to area groundwater resources, APC will use water produced in associate with CBNG or conventional oil and gas for well stimulation. This water is a by-product and would become a beneficial-use to stimulate production in these conventional wells. To reduce traffic volume and associated air quality concerns, water for drilling and stimulation will be transported from a centralized water gathering system to the active well site via temporary water line laid on the surface or permanently installed pipelines. Proposed pipeline routes will be included in individual NOS/APD surface use plans. BLM will analyze the site-specific proposal, its design features, and its operator committed measures. BLM, with the operator as much as possible, will determine which if any of the programmatic mitigation measures to apply from the PRB FEIS ROD, from this EA's Appendix D, or whether to consider the application of other mitigation measures supported by further specific analysis.

4.2.3.1.4. Residual Effects

The BLM anticipates no residual effects to ground water. BLM bases this analysis on the outcomes of the present CBNG and conventional mineral drilling and production in the PRB, the operators' application of best management practices and compliance with Onshore Oil and Gas Orders #s 2 and 7, programmatic and site-specific COAs, and the distances between the aquifers and the target formations.

4.2.3.2. Surface Water

Direct, indirect, and cumulative effects to surface water may result from disturbances associated with the proposal, including the removal of vegetation, exposure of the underlying soil surface, and compaction of the soil. These activities could result in increased surface runoff, erosion, and sedimentation. Operators and BLM will mitigate the potential for erosion and sedimentation hrough the implementation of ACMs listed in Appendix A, particularly the expedited stabilization of areas with severe erosion potential, and the use of waterbars, erosion control fabric and application of programmatic and site-specific COAs. These potential effects are within the analysis parameters of the PRB FEIS, p. 4-77.

As discussed in Section 3, approximately 230 acres (less than 1%) lies within a 300 foot buffer of surface water. Since the specific locations of the proposed wells and access roads are not yet defined, the potential disturbances in close proximity to surface waters are not quantifiable at this time, but will be evaluated during APD review. Siting of wells under the proposed action will consider these sensitive areas and, should development occur, mitigation would be applied for project activities occurring in or adjacent to these areas as described in the ACMs in Appendix A. Furthermore, the proposed action will not result in surface discharges of produced water. BLM foresees no residual effects to surface water.

4.3. Mineral Resources

BLM only addresses resources identified in Section 3, Mineral Resources, with potential for impact in this section; therefore, only uranium mining is addressed here. Refer to the PRB FEIS, pp. 4-127 to 4-130 for additional information on potential impacts to mineral resources. Subsurface uranium deposits in the CCE area are associated with Wasatch Formation sandstones. The direct, indirect, and cumulative effects of CCE development with proper well completion, design features, and mitigation should likely to result in no residual effects to either the drilling or the mining. These measures should also preclude comingling of produced water and uranium-bearing waters in this formation. Due to the tight well spacing requirements and other infrastructure associated with uranium development (see Section 3, Locatable

Minerals), future uranium mining activities in the CCE project area could be constrained or precluded by the presence of the proposed oil and gas wells. Should other development occur in or adjacent to the CCE area, the potential locations available for locatable mineral development could be future constrained. Operators practice preventative steps to mitigate the potential for future conflicts with uranium mines and fluid minerals by participating in a cost sharing agreement for road maintenance with Uranium One, Cameco and Uranez, as well as a verbal cooperative agreement related to mineral development. Operators will maintain continued dialogue with uranium mine operators holding active claims and/or leases in the project area to identify and resolve potential resource and access conflicts. When practicable, fluid mineral operators will site operations in low impact locations away from active mining, and conflicts between uranium development and the proposed action would be unlikely.

4.4. Wetland and Riparian

The PRB FEIS disclosed effects to wetland and riparian areas from oil and gas development, including a discussion of direct and indirect impacts, cumulative impacts, and residual impacts, pp. 4-173 to 4-179. Approximately 2,778 acres (8%) of the overall project area is within a 500-foot buffer of riparian habitat; see Section 3. The specific locations of the proposed wells and access roads are undefined, so potential disturbances to wetlands and riparian buffer areas are not quantifiable at this time, but will receive analysis during APD processing. Siting of wells under the proposal will consider and avoid these sensitive areas to the extent practicable. BLM and operators will apply design features and mitigation tor project activities occurring in or adjacent to these areas as described in the ACMs in Appendix A to preserve watershed values, including natural drainages.

The cumulative impacts of the CCE proposal, when considered with other existing and proposed development in the project area are not expected to be significant. The application of ACMs will ensure that the incremental impacts of the proposed action, when considered with any existing development are insignificant. For more information on cumulative impacts, please refer to the PRB FEIS, p. 4-178.

4.5. Invasive, Non-native Species

4.5.1. Direct and Indirect Effects

The Campbell and Johnson County Weed and Pest Boards relayed that 8 State-listed noxious weed species are known to exist in or near the project area and 2 additional species are likely to occur. The use of existing facilities under the no action alternative along with the surface disturbance associated with construction of proposed well pads, access roads, pipelines, and related facilities would present opportunities for weed invasion and spread. The activities related to the performance of the proposed project would create a favorable environment for the establishment and spread of noxious weeds/invasive plants. The construction of improved roads, utilities, and other surface disturbances increase the vulnerability of adjacent ecosystems to invasion by noxious weed species. For instance, the expansion of cheatgrass in the Great Basin is shown to be closely linked to proximal land uses: cheatgrass was 13% more likely to be found within 700 meters of a road and 15% more likely to be found within 1 kilometer of a power line (Bradley et al. 2006). Plant communities in semiarid landscapes were shown to be differentially susceptible to invasions originating from roadside verges based on dominant vegetation, soil moisture, nutrient levels, soil depth, disturbance, and topography (Gelbard 2003).

Mitigation in the ACM and APC's Integrated Weed and Pest Management Plan (Appendix B) should reduce potential impacts from noxious weeds and invasive plants. Additionally, the use of multi-well pads and the ability of a single horizontal well to extract oil and gas from an area that would normally require multiple vertical wells will reduce the amount of disturbed surface susceptible to noxious weed invasion in the project area by approximately 1,800 acres, see Table 2-2.

4.5.2. Cumulative Effects

BLM addressed cumulative impacts to the spread of invasive, non-native species in the impacts to vegetation in the PRB FEIS, pp. 4-164 to 4-172.Cumulative effects for invasive, non-native species include the expansion, and opportunities for expansion, for invasive plants species as the result of existing and approved development, combined with new disturbances and a potential increase in the likelihood of range fire and its heightened intensity - that may result from the CCE proposal. Initially, the CCE proposal would increase surface disturbance by roughly 630 acres over the estimated 827 acres of disturbance that would occur under the no action alternative. The cumulative 1,457 acres of surface disturbance from existing, planned, and the proposed development create vectors for the spread and introduction of invasive, non-native species, adding to the cumulative effects from invasive species in the project area. Any additional, unconnected development by area operators could result in further invasive, non-native species expansion. Operator's use of horizontal wells and multi-well pads will result in approximately 1,800 fewer acres of post-interim reclamation disturbance than if the area were developed using single, vertical oil and gas wells. In addition, the CCE proposal is planned in an area affected by mineral development, which represents approximately 2% of the land surface, distributed over the area. By comparison, the proposal represents an additional 2% of surface disturbance in the CCE area.

4.5.3. Mitigation Measures

As any surface disturbed in association with this project is re-seeded for stabilization, interim, or final reclamation, the operator will treat for invasive species as soon as possible, specifically to minimize the invasion of cheat grass. BLM will analyze the site-specific proposal, its design features, and its operator committed measures. BLM, with the operator as much as possible, will determine which if any of the programmatic mitigation measures to apply from the PRB FEIS ROD, from this EA's Appendix D, or whether to consider the application of other mitigation measures supported by further specific analysis.

4.5.4. Residual Effects

One of the greatest obstacles to maintaining healthy ecosystems and restoring impaired ecosystems is the rapid expansion of noxious weeds. Invasive plants can dominate sites previously by occupied by native plant species, often resulting in permanent damage to plant communities and their associated ecosystems (BLM 1996), as discussed in the PRB FEIS, p. 4-158. The post-interim reclamation of approximately 489 acres of previously disturbed sites in the project area would provide opportunities for the reestablishment of native vegetation. The loss of vegetative cover, despite expedient reclamation, for several years until reclamation is successfully established could continue to provide opportunities for the spread of invasive, non-native species following the end of the project's life. In some instances, minimizing the establishment and spread of unwanted invasive species on or near disturbed and reclaimed areas may be extremely difficult or cost-prohibitive.

4.6. Wildlife

The PRB FEIS discussed direct and indirect impacts to wildlife species, pp. 4-181 to 4-249.

4.6.1. Big Game Species

4.6.1.1. Direct and Indirect Effects

Refer to the PRB FEIS, pp. 4-181 to 4-215, for a discussion on the direct and indirect impacts to big game associated with oil and gas developments. Direct and indirect impacts from the proposed action on big game are anticipated to be of the same type as those discussed in the PRB FEIS under Alternative 1. Direct effects to big game species and their habitat include incremental long-term surface-disturbance and habitat loss associated with construction of proposed project wells, road, facilities, pipelines, and other ancillary project components. Indirect impacts to big game species generally include increased habitat fragmentation effects as a result of increased noise levels and human presence, dispersal of noxious and invasive weed species, and dust effects from unpaved road traffic. In addition to these effects, which generally contribute to the decline of big game populations, oil and gas development may limit access or discourage hunters from harvesting big game in some areas, allowing populations to increase. Primary direct and indirect impacts to pronghorn antelope and mule deer may occur through alterations in hunting and/or poaching, increased vehicle collisions, harassment and displacement, increased noise, increased dust, alterations in nutritional status and reproductive success, increased fragmentation, loss or degradation of habitats, reduction in habitat effectiveness, and declines in populations. However, it is worth noting that, with the exception of mule deer, big game populations in the project area are above WGFD objectives (see Section 3). Since the specific locations of the proposed wells, access roads, and facilities are undefined, site-specific estimates of surface disturbances in big game year-long and winter/year-long ranges are not quantifiable.

Measures intended to avoid, minimize, and mitigate impacts to big game are in the ACMs, Appendix A. These measures include safety devices, fencing of prevent entrapment, and a commitment to timely revegeation of disturbed areas not needed during production. In addition, new private roads created for use during the life of the project would not be available for use by the general public, and would therefore not result in new public access points for hunting activities that could affect big game and other species.

4.6.1.2. Cumulative Effects

BLM assessed the cumulative effects on big game populations on the herd unit scale. The effects of the proposal on mule deer populations are difficult to predict because of the many unknown factors associated with each of the potential effects and the potential for a synergistic relationship among the individual effects. Because it would result in additional surface disturbance and disruptive activities, the proposal would likely increase avoidance behaviors exhibited big game species in human occupied areas and could exacerbate the declining trend of mule deer in the Pumpkin Buttes herd unit in the short-term. However, extensive oil and gas development in the region likely contributed to population increases for 3 of the 4 big game species that area present in the project area of by limiting or discouraging access by hunters (WGFD 2011). However, over the life of this proposal the project could limit future adverse impacts to mule deer. Over the anticipated 40-year life of the proposed wells, the existing CBNG wells in the area will likely be plugged and abandoned. As these CBNG wells time out, and because of the ability of a single horizontal well to extract oil and gas from an area that would normally require multiple vertical wells, the amount of overall surface disturbance and human disruption in the project area would likely decrease. However, additional new development by APC and other operators adjacent to the project area and in these herd units, should it occur, could replace some of the expected decline from CBNG well time outs. See Section 2 for graphical illustrations of the anticipated long term versus short term facilities in the project area.

4.6.1.3. Mitigation Measures

BLM will analyze the site-specific proposal, its design features, and its operator committed measures. BLM, with the operator as much as possible, will determine which if any of the programmatic mitigation measures to apply from the PRB FEIS ROD, from this EA's Appendix D, or whether to consider the application of other mitigation measures supported by further specific analysis.

4.6.1.4. Residual Effects

Residual effects identified in the PRB FEIS, p. 4-408 include the loss of vegetative cover (i.e., wildlife habitats) and the disruptive effect minimizing the use of habitats about 0.5 miles from surface disturbances - extending beyond the life of the project, until reclamation is successfully established. Even with expedient reclamation, wildlife populations may not reach pre-disturbance levels for many years.

4.6.2.Raptors

4.6.2.1. Direct and Indirect Effects

The PRB FEIS discussed direct and indirect effects to raptors, pp. 4-216 to 4-221, and would be similar to those described under the PRB FEIS, Alternative 1. The no action alternative would result in similar effects, but to a lesser magnitude. There are multiple raptor nest sites exist in the CCE area. Approximately 29,910 acres of the project area occur in protective buffers of known raptor nest locations; however, only approximately 3.4% (1,227 acres) of the project area would be subject to surface disturbance and proposed project activities that could affect documented raptor nests. Possible effects to raptors include: increased direct mortality (including poaching, collisions with power lines and vehicles, and electrocution on power lines); the introduction of new perches; direct loss or degradation of habitats; indirect disturbance from human activity (including harassment, displacement, noise, and degradation or loss of habitats important to prey species); habitat fragmentation; and changes in population levels.

Certain life history characteristics, including typically long life spans, slow reproductive rates, and specific habitat requirements for nesting and foraging, make raptor populations particularly vulnerable to disturbances and may slow recovery of some populations. Raptors may temporarily or permanently abandon their roosting area or nests in response to disturbance. Ferruginous hawks and golden eagles are especially sensitive to human activity. Raptor nests protected with 0.5 mile of surface disturbance limitations occur in the project area (see SDR No. WY-2011-029). APC would document these during pre-construction surveys to determine active or inactive status, and protected in accordance with the ACMs, Appendix A. In addition, all overhead lines would be designed, constructed, and installed by Powder River Energy Corp. in accordance with the standards in *Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006* in order to minimize the possibility of raptor electrocutions in the project area (APLIC 2006).

Where active nests are documented during pre-construction surveys, timing stipulations would prohibit construction during the nesting season. A nest is “active” if any breeding activities or attendance was observed during any of the most recent 3 years. To reduce the risk of decreased productivity or nest failure, the BLM BFO requires a 0.5-mile radius timing limitation for surface-disturbing activities during the breeding season (February 1 through July 31) around active raptor nests and recommends all infrastructures requiring human visitation be located to provide adequate biologic buffer for nesting raptors. A biologic buffer is a combination of distance and visual screening that provides nesting raptors with security such that they will not be flushed by routine activities. However, because non-surface-disturbing disruptive activities could still continue to occur even during the breeding season, there is a potential for noise and other human activity effects should APC site infrastructure near active nests.

4.6.2.2. Cumulative Effects

Cumulative impacts to raptors were assessed in the 29,910 acres of the project area found in the protective buffers of known raptor nest locations. The cumulative effects to raptors associated with the proposed action are within the analysis parameters and impacts described in the PRB FEIS. For details on expected cumulative impacts, refer to the PRB FEIS, p. 4-221. In general, short term, adverse cumulative effects to raptors from current, proposed, and future activities in the project area include increased disturbance to nesting raptors, degradation or destruction of nesting habitats, increased raptor collisions with power lines, increased electrocutions, and increased vehicular collisions with raptors feeding on carrion. Increased perching opportunities associated with the construction of new overhead power lines in the area, however, may provide a positive effect to raptors.

Long term, cumulative adverse impacts to raptors in the project area would likely decrease. Over the life of the proposed action, the existing CBNG wells in the project area will likely be plugged and abandoned. As these CBNG wells time out, and because of the ability of a single horizontal well to extract oil and gas from an area that would normally require multiple vertical wells, the amount of overall surface disturbance and human disturbance in the project area would likely decrease. This decline could reduce human caused mortality and disturbance of raptors, and could increase habitat for prey species. However, additional new development by APC and other operators adjacent to the project area but with raptor buffers, should it occur, could replace some of the expected decline from CBNG well time outs. See Section 2 for illustrations of the anticipated long term versus short term facilities in the project area.

4.6.2.3. Mitigation Measures

BLM will analyze the site-specific proposal, its design features, and its operator committed measures. BLM, with the operator as much as possible, will determine which if any of the programmatic mitigation measures to apply from the PRB FEIS ROD, from this EA's Appendix D, or whether to consider the application of other mitigation measures supported by further specific analysis.

4.6.2.4. Residual Impacts

Residual impacts to breeding raptor species in the project area could result in the abandonment of a nest site or territory, or the loss of eggs or young, due to the permanent nature of project components, noise, or human presence, particularly during the raptor breeding season (January 1 through August 31). Deliberate take of an active nest site, incubating adults, eggs, or young would violate the MBTA and, would violate the Bald and Golden Eagle Protection Act if bald or golden eagles are present.

4.6.3. Migratory Birds

4.6.3.1. Direct and Indirect Effects

The PRB FEIS discussed the direct and indirect effects to migratory birds, pp. 4-231 to 4-235. The PRB FEIS reads on page 4-231, "Surface disturbance associated with construction, operation, and abandonment of facilities, including roads, has the potential to result in direct mortality of migratory birds. Most birds would be able to avoid construction equipment; however, nests in locations subject to disturbance would be lost, as would any eggs or nestlings." Direct mortality of a bird or destruction of an active nest due to construction activities would result in a "take" as defined (and prohibited) by the MBTA, a non-discretionary statute, and in turn a violation of the law. See also, FLPMA, Sec. 302(b).

Specific measures to protect migratory birds are not included in the current updated and amended 1985 RMP. Although the PRB FEIS ROD addressed the potential impacts from oil and gas development to migratory birds, it did not identify specific conservation measures to help mitigate those impacts.

The RMP is currently under revision, and as directed by BLM Instruction Memorandum WY-IM-2013-005, a change in management for migratory birds is being considered among the alternatives. Until the RMP revision is complete, the BFO will provide project level site-specific analysis of conservation measures implemented for migratory bird protection, and compliance with the MBTA. Direct impacts of the CCE proposal to nesting and breeding migratory birds may occur. Potential direct impacts to migratory birds would result from the surface disturbance in potential breeding, nesting, and foraging habitat (excluding developed areas) in the project area. An ACM to excluded migratory birds, through the use of bird cones, from all facilities that pose a mortality risk or could entrap these animals would prevent these types of adverse effects. Additional impacts could include: displacement from suitable nesting habitats during the breeding season due to increased noise levels and visual disturbances on the landscape; nest abandonment; reduced habitat values in foraging areas due to prey displacement, potential loss of prey habitat, and an increased potential for collisions with vehicles traveling in the project area. Ingelfinger identified that the density of breeding Brewer's sparrows declined by 36% and breeding sage sparrows declined by 57%within 100 meters of dirt roads in a natural gas field (Ingelfinger, 2004).

Impacts to breeding migratory bird species could result in the abandonment of a nest site or territory, or the loss of eggs or young, if project activities were to occur during the breeding season (April 1 through July 31 for passerine). Development could also result in indirect impacts from habitat fragmentation effects such as increased noise levels and human presence, dispersal of noxious and invasive weed species, and dust effects from unpaved road traffic. However, the degree of these potential impacts would depend on a number of variables including the location of the nest site, the species' relative sensitivity, breeding phenology, and possible topographic shielding.

BLM provided minimal protection for migratory bird nesting through timing limitations applied for Greater Sage-Grouse (GSG) and raptor nesting. Many multi-well CBNG projects covered large areas that encompassed GSG nesting habitat or raptor nests. Timing limitation COAs for those projects were likely to adequately protect migratory birds during the nesting season by timing the development in a project area. Operators were likely to wait to construct all wells and facilities until limitations were lifted for the entire area, to reduce labor and mobilization costs and inefficiencies from completing small portions of the project at a time. With conventional oil projects, operators are more likely to construct during the migratory bird nesting season if surveys reveal no active raptor nests or GSG leks.

To ensure compliance with the MBTA, the FWS recommends construction occur outside of the migratory bird breeding season (February 1- August 31). Based on the nesting phenology of Brewer's sparrow and sage thrasher (BLM SSS that nest in sagebrush) the BLM recommends the timing limitation be shortened to (May 1 – August 1) for construction within sagebrush. Nest initiation and egg laying in Brewer's sparrows typically occurs mid-May to mid-July. Some young fledge in late July. Sage thrashers may lay a second clutch of eggs as late as mid-July. Lark sparrows in northern latitudes lay eggs from early May to mid-July (Information on breeding habits available on the Birds of North America Online: http://bna.birds.cornell.edu/bna). GSG timing limitations on surface disturbing activities will mitigate impacts to nesting migratory birds from March 15 – June 30. However, Brewer's sparrow and sage thrasher are likely to still have eggs or nestlings into July. Only a percentage of known raptor nests are active any given year, so the protections for migratory birds from June 30 - July 31 will depend on how many raptor nests are active. The least restrictive measures (in this case only applying GSG and raptor timing limitations) are inadequate to protect nesting sensitive migratory birds in the project area.

4.6.3.2. Cumulative Effects

BLM assessed cumulative effects for migratory birds in the project area. These effects associated with the proposed action are within the analysis parameters and impacts described in the PRB FEIS. For details on expected cumulative impacts, including qualitative predictions for population trends for migratory bird species of management concern in Wyoming, refer to the PRB FEIS, pp. 4-231 to 4-235. Impacts from the proposed action and other activities in the project area, as well as impacts that have already occurred include direct mortality, habitat loss, displacement, habitat fragmentation, and population-level effects. Cumulative impacts from these effects in the project area result in the decline of some migratory bird populations, while populations of other species that are adaptable to disturbance may increase.

Long-term, cumulative adverse impacts to migratory birds in the project area would likely decrease. Over the life of the proposed action, the existing CBNG wells in the project area will likely be plugged and abandoned. As these CBNG wells time out, and because of the ability of a single horizontal well to extract oil and gas from an area that would normally require multiple vertical wells, the amount of overall surface disturbance and human disturbance in the project area would likely decrease. This decline could reduce human caused mortality and disturbance of migratory birds, and could increase habitat when reclaimed areas are successfully revegetated. See Section 2 for graphical illustrations of the anticipated long term versus short term facilities in the project area.

4.6.3.3. Mitigation Measures

The preferred conservation measure for protection of migratory bird SSS is avoiding construction in sagebrush stands. If construction in sagebrush stands is unavoidable, then there are 2 options for

construction in sagebrush stands consistent with the BLM Sensitive Species Policy (6840), Wyoming BLM Migratory Bird Instruction Memorandum (WY-IM-2013-005) and the Migratory Bird Treaty Act:
1) clear the pad area outside the nesting season (nesting season May 1-August 1).
2) clear the pad within 1 week of doing a survey with negative results during the nesting season.

4.6.3.4. Residual Effects

Migratory birds nesting adjacent to the well pad or road may be disturbed by construction and production activities. A timing limitation does nothing to mitigate loss and fragmentation of habitat. Suitability of the project area for some migratory birds will be negatively affected due to habitat loss and fragmentation and proximity of human activities associated with oil and gas development. Well pad clearing and construction done outside the nesting season may create habitat for mountain plover. Pads that are cleared before breeding season and then left alone may attract plovers.

4.7. Threatened, Endangered, and Candidate Species

Refer to the PRB FEIS, pp. 4-250 through 4-273, for direct and indirect impacts to threatened, endangered, and candidate species in the CCE area associated with the no action alternative. This section discusses (1) the GSG, a candidate for ESA listing and BLM SSS occurring in the CCE area, and (2) the Ute ladies'-tresses orchid (ULT), a ESA threatened species with potential habitat in the project area.

4.7.1. Greater Sage-Grouse (GSG)

4.7.1.1. Direct and Indirect Effects

The GSG is a candidate species for federal protection under the ESA. Research shows that declines in lek attendance correlate with oil and gas development. Effects to GSG populations generally result from the loss and fragmentation of sagebrush habitats associated with the construction of well pads, roads, and other facilities. Both males and hens typically avoid nesting and inhabiting in or adjacent to developed areas. Additionally, noise can affect GSG by preventing vocalizations that influence reproduction and other behaviors (BLM 2008). In a study of GSG population response to natural gas field development in western Wyoming, Holloran (BLM 2012b) concluded that increased noise intensity associated with active drilling rigs within 5 kilometers (3.1 miles) of leks negatively influenced male lek attendance.

Several other studies support well density and proximity to GSG leks as useful metrics for evaluating impacts to GSG, as measured by declines in lek attendance (Braun et al. 2002, Holloran et al. 2005, and Walker et al. 2007). The State Wildlife Agencies' Ad Hoc Committee for Consideration of Oil and Gas Development Effects to Nesting Habitat (2008) determined that oil or gas development exceeding approximately 1 well pad per square mile resulted in calculable impacts on breeding populations, as measured by the number of male GSG attending leks (State Wildlife Agencies' Ad Hoc Committee 2008), and recommended that impacts be considered for leks within 4 miles of oil and gas developments.

The 2012 *Viability Analyses For Conservation Of Sage-Grouse Populations* prepared for the BLM BFO indicated that effects from energy development, as measured by male lek attendance, are discernible out to a distance of 12.4 miles (Taylor et al. 2012). In its *Recommendations for Development of Oil and Gas Resources within Important Wildlife Habitats* (WGFD 2010), WGFD categorized impacts to GSG by number of well pad locations per square mile within 2 miles of a lek and in identified nesting/brood-rearing habitats greater than 2 miles from a lek. The WGFD analysis, found moderate impacts occur when well density is between 1 and 2 well pad locations per square mile or where there is less than 20 acres of disturbance per square mile; high impacts occur when well density is between 2 and 3 well pad locations per square mile or when there are between 20 and 60 acres of disturbance per square mile; and extreme impacts occur when well density exceeds 3 well pad locations per square mile or when there are greater than 60 acres of disturbance per square mile. There are 2 known non-core habitat GSG leks in the CCE area that are extremely impacted by oil and gas development based on WGFD-defined categories of impact (WGFD 2010). Since the specific locations of the proposed wells and access roads are not yet defined, potential increases in well density around these leks are not quantifiable at this time.

The CCE proposal incorporates design features minimizing effects to GSG populations. To protect nesting and brood rearing GSG, BLM will implement a timing limitation (March 15 to June 30) on project surface-disturbing activities. Appendix A includes ACMs designed to minimize impacts to GSG. These measures include noise reduction strategies and timing restrictions. A timing limitation does not mitigate loss and fragmentation of habitat or changes in disease mechanisms. In addition to timing restrictions, effective mitigation strategies may include, at a minimum, burying power lines where possible; minimizing road and well pad construction, vehicle traffic, and industrial noise (WYDOT 2012a, Anderson); and managing produced water to prevent the spread of mosquitoes with the potential to vector West Nile Virus in GSG habitat (APLIC 2006). Walker et al. (2007; APLIC 2006) recommend maintaining extensive stands of sagebrush habitat over large areas (at least 1 mile in size) around leks to ensure GSG persistence. The size of such a no-development buffer would depend on the amount of suitable habitat around the lek and the population impact deemed acceptable. Connelly et al. (2000; WDA 2012a) recommended locating all energy-related facilities at least 2 miles from active leks.

Based on the summary of research describing the impacts of energy development on GSG, efforts to reduce habitat loss and fragmentation are likely to be the most effective in ensuring long-term lek persistence. The PRB FEIS discussed direct and indirect impacts to GSG in more detail, pp. 4-257 to 4-273. Additionally, the *12-Month Findings for Petitions to List the Greater Sage-Grouse (Centrocercus urophasianus) as Threatened or Endangered* (USFWS 2010) and chapters 15-21 of Greater Sage-Grouse: Ecology and Conservation of a Landscape Species and its Habitats (Knick and Connelly 2011) – both discuss impacts to GSG associated with energy development in detail.

4.7.1.2. Cumulative Effects

Recent research suggests that the cumulative and synergistic effects of current and foreseeable CBNG and conventional oil and gas development in the vicinity of the project area are likely to impact the local GSG population, cause declines in lek attendance, and may result in local extirpation. The GSG population in northeast Wyoming is exhibiting a steady long term downward trend, as measured by lek attendance (WYDOT No Date). Research suggests that these declines may be a result, in part, of CBNG and conventional oil and gas development, as discussed in detail in USFWS (2010; WYDOT 2012b).

BLM’s cumulative impact assessment for the CCE project include an area that encompassed a 4-mile radius around the 9 GSG leks occurring within 4 miles of the CCE boundary (see Map 6). Analysis of impacts up to 4 miles was recommended by the State Wildlife Agencies’ Ad Hoc Committee for Consideration of Oil and Gas Development Effects to Nesting Habitat (State Wildlife Agencies’ Ad Hoc Committee 2008). In accordance with the findings of the 2012 *Viability Analyses For Conservation Of Sage-Grouse Populations*, which indicated that declines in male lek attendance due to energy development are discernible to a distance of 12.4 miles, further analysis revealed 45 leks within a 12-mile buffer of the project area, 6 of which were in GSG core habitats. Of 1,750 permitted and producing oil and gas wells in a 4-mile buffer of the CCE area, 1,423 wells are also within a 4-mile buffer of GSG leks.

The locations of the proposed wells and access roads are undefined so potential increases in well density around leks in and adjacent to the project area are unquantifiable at this time. Even if all 24 proposed well pads were within a 4-mile buffer surrounding project area GSG leks, the resulting increase in existing well density would be small (less than 1%). The existing density of wells within 2 and 4-mile buffers of project area leks are 6.3 and 6.9 wells per square mile, respectively. As shown in Table , the 2 known non-core habitat GSG leks in the project area, as well as 7 additional leks within a 4-mile buffer of the project area, are extremely impacted by oil and gas development, WGFD 2010.

The building of wells and infrastructure, noise, and other project-related impacts associated with the proposed action are likely to contribute to GSG population decline through the direct and indirect effects described above; however, BLM anticipates the cumulative impacts from the CCE proposal to be minor relative to the high level of existing development in the area, in which the 36 proposed wells would represent only a 2% increase in the number of producing wells within 4 miles of the project area. Although the well density does not appreciably increase, amount of traffic for production and product transport, as well as human activity associated with production, is anticipated to increase. Refer to the PRB FEIS, pp. 4-271 through 4-273, the 2010 USFWS listing decision, and Taylor et al 2012 for additional information on cumulative impacts associated with GSG from oil and gas development.

4.7.1.3. Mitigation Effects

BLM will analyze the site-specific proposal, its design features, and its operator committed measures. BLM, with the operator as much as possible, will determine which if any of the programmatic mitigation measures to apply from the PRB FEIS ROD, from this EA's Appendix D, or whether to consider the application of other mitigation measures supported by further specific analysis.

4.7.1.4. Residual Effects

A timing limitation does not mitigate loss and fragmentation of habitat or changes in disease mechanisms. Suitability of the project area for GSG will be negatively affected due to habitat loss and fragmentation and proximity of human activities associated with fluid mineral development. Management of energy development based on current PRB core habitat area configurations and associated lease stipulations, COAs, and best management practices may not provide enough contiguous habitats to protect the remaining population viability of PRB GSG without a substantial investment in restoration.

4.7.2. Ute Ladies'-Tresses Orchid (ULT)

As discussed in Section 3, above, despite the presence of potentially suitable ULT habitat, it is highly unlikely that the species exists in the project area. Since the specific locations of the proposed wells and access roads are undefined, the potential disturbance of suitable ULT habitat are unquantifiable at this time, but will be evaluated during APD review. Siting of wells under the proposed action will consider these sensitive areas and, should development occur, mitigation would be applied for project activities occurring in or adjacent to these areas as described in the ACMs in Appendix A.

4.8. BLM Special Status (Sensitive) Species (SSS)

BLM will take necessary actions to meet the policies set forth in SSS policy (BLM Manual 6840). BLM Manual 6840.22A reads that "The BLM should obtain and use the best available information deemed necessary to evaluate the status of special status species in areas affected by land use plans or other proposed actions and to develop sound conservation practices. Implementation-level planning should consider all site-specific methods and procedures which are needed to bring the species and their habitats to the condition under which the provisions of the ESA are not necessary, current listings under special status species categories are no longer necessary, and future listings under special status species categories would not be necessary." Approximately 17 SSS may occur in the proposed project area as shown in Section 3. SSS that occur in the project area may be directly and indirectly affected by proposed project activities. The extent of effects to any specific species depends on individual species life history, habitat preferences, adaptability to disturbance, and population levels in the portion of the project area that would be affected. Since exact size and location of SSS populations in the project area are unknown, and because the relationship between occupied areas and proposed project activities is unknown, only the general types and levels of impacts can be identified. Refer to the PRB FEIS, pp. 4-257 to 4-265 for a detailed discussion of impacts to SSS in the project area. Impacts to sensitive species in the project area would be similar to those discussed in the PRB FEIS under Alternative 1. Impacts under the no action alternative would be similar in type but of a lesser magnitude. To reduce the risk of disruption and harassment to sensitive species, timing limitations on surface disturbing activities will be utilized based on species requirements. Cumulative effects, mitigation measures, and residual effects receive site-specific analysis in the APD analysis.

4.9. Visual Resources

The CCE proposal likely will have minor, to no direct, indirect, and cumulative effects to the visual resource management class north of 45.20 North due to operators' design features and BLM COAs. Yet the CCE project may have moderate to major effects on the visual resource management (VRM) and viewshed associated south of 45.20 North. If site-specific proposals have effects in this southern region of the CCE proposal the effects will likely adversely increase the further south the site-specific development becomes to the Pumpkin Buttes, see, cultural resources, below. Despite the best operator and BLM design features and mitigation measures site-specific challenges remain to comply with the VRM and programmatic agreements. Residual effects, if any await site-specific analysis of yet unspecified APDs.

4.10. Cultural Resources

4.10.1. Direct and Indirect Effects

BFO will consider site specific impacts to historic properties resulting from proposed site specific impacts when receiving APDs. Impacts would be avoided or mitigated in consultation with the Wyoming SHPO, tribes and interested parties. BFO will consult with interested tribes if potential TCPs or sacred sites are identified during the cultural resource inventory.

BLM and the Wyoming SHPO signed the Programmatic Agreement Regarding Mitigation of Adverse Effects to the Pumpkin Buttes Traditional Cultural Property from Anticipated Federal Minerals Development (BLM and SHPO 2009) (PA) addressing mitigation of adverse effects to the Pumpkin Buttes TCP (PBTCP) from anticipated federal minerals development. The PA addresses direct physical impacts to the TCP, and impacts to the setting within 2 miles of the TCP. The PBTCP is approximately 1 mile southeast of the project area (see Map 7). To avoid adverse effects to the PBTCP, APC will not propose wells, project traffic, roads, and other facilities within 2 miles of the PBTCP in relation to this project. Any future wells and/or project infrastructure within 2 miles of the PBTCP will adhere to the mitigation measures described in the Pumpkin Buttes PA or the project will require consultation between the BLM, the Wyoming SHPO, and affected tribes.

4.10.2. Cumulative Effects

Construction and development of oil and gas resources impacts cultural resources through ground disturbance, unauthorized collection, and visual intrusion of the setting of historic properties. This results in fewer archaeological resources available for study of past human life-ways, changes in human behavior through time, and interpreting the past to the public. Additionally, these impacts may compromise the aspects of integrity that make a historic property eligible for the National Register of Historic Places (NRHP). Recording and archiving basic information about archaeological sites and the potential for subsurface cultural materials in the proposal area serve to partially mitigate potential cumulative effects to cultural resources.

Fee actions constructed in support of federal actions can result in impacts to historic properties. Construction of large plans of coalbed natural gas development on split estate often include associated infrastructure that is not permitted through BLM. Project applicants may connect wells draining fee minerals, or previously constructed pipelines on fee surface with a federal plan of development. BLM has no authority over such development which can impact historic properties. BLM has the authority to modify or deny approval of federal undertakings on private surface, but that authority is limited to the extent of the federal approval. Historic properties on private surface belong to the surface owner and they are not obligated to preserve or protect them. The BLM may go to great lengths to protect a site on private surface from a federal undertaking, but the same site can be legally impacted by the landowner at any time. The cumulative effect of numerous federal approvals can result in impacts to historic properties.

Archeological inventories reveal the location of sites and although the BLM goes to great lengths to protect site location data, information can potentially get into the wrong hands. BLM authorizations that result in new access can inadvertently lead to impacts to sites from increased visitation by the public.

4.10.3. Mitigation Measures

BLM will consider site specific mitigation after receiving and analyzing APDs. BLM will analyze the site-specific proposal, its design features, and its operator committed measures. BLM, with the operator as much as possible, will determine which if any of the programmatic mitigation measures to apply from the PRB FEIS ROD, from this EA's Appendix D, or whether to consider the application of other mitigation measures supported by further specific analysis.

4.10.4. Residual Effects

During the construction phase, there will be numerous crews working across the project area using heavy construction equipment without the presence of archaeological monitors. Due to the extent of work and the surface disturbance caused by large vehicles, it is possible that unidentified cultural resources can be damaged by construction activities. The increased human presence associated with the construction phase can also lead to unauthorized collection of artifacts or vandalism of historic properties.

4.11. Paleontology

Potential effects to paleontological resources are discussed in the PRB FEIS, pp. 4-125 to 4-127. Because all geologic units in the project area are designated PYFC 3a, suggesting that disturbances in the project area could impact common fossils, but are unlikely to affect significant paleontological resources, it is unlikely adverse impacts to significant paleontological would occur. However, if paleontological resources, either large or conspicuous, and/or a significant scientific value are discovered during construction, the find would be reported to the Authorized Officer immediately and the following resource protective measures would be taken. Construction would be suspended within 250 feet of said find. An evaluation of the paleontological discovery would be made by a BLM-approved professional paleontologist within 5 working days, weather permitting, to determine the appropriate action(s) to prevent the potential loss of any significant paleontological values. Operations within 250 feet of such a discovery would be resumed after written authorization to proceed is issued by the Authorized Officer.

4.12. Transportation and Access

4.12.1. Direct and Indirect Effects

This section analyzes the direct and indirect effects on transportation resources in the CCE area based on the anticipated traffic per well and the mileage of new and upgraded roads introduced in Section 2. Direct effects would include increases in vehicular traffic and the risk of traffic accidents on existing roadways in the project area from daily travel of project-related employees and operations. Indirect effects from the additional traffic include an increase the rate of degradation of the existing public roadways in the project area, additional air emissions, see Section 3, Air Quality, fugitive dust, noise, increased potential access to remote areas, an increased risk of vehicle collisions with livestock and wildlife, and visual intrusion of project-related vehicles and activities. Since the specific locations of the proposed wells and access roads are undefined, site-specific estimates of increases in vehicular traffic and the associated potential risks of traffic accidents for the public roads in the project area are not quantifiable at this time. The PRB FEIS, pp. 4-298 to 4-301 provides additional context and information on expected transportation impacts resulting from oil and gas development in the PRB.

The use of back-to-back completions and the construction of a centralized water tap would reduce the number of vehicle trips required to develop and operate wells in the project area. APC also currently maintains a cost sharing agreement with uranium project proponents, which will help mitigate road maintenance concerns and reduce potential conflicts between users. Roads used or developed for the proposed project would be built to include all water control structures (such as wing ditches, culverts, relief ditches, low water crossings, surfacing, etc.) and would be surfaced with sufficient gravel to prevent erosion of the road surface and allow safe operation.

Operators would avoid travel on two-track roads during periods of inclement weather or spring thaw when the possibility exists for excessive surface damage (e.g., rutting in excess of 4 inches, travel outside two-track roadway, etc.). Operators would restrict travel to 25 miles per hour or less to reduce resource damage and provide for safe operation on operator constructed and maintained roads. If a fugitive dust problem is identified by the BLM as a result of this project, immediate abatement measures (e.g., applications of water or chemical dust suppressants to disturbed surfaces) would be initiated in consultation with the BLM and WDEQ to avoid exceeding ambient air quality standards. Operators may use magnesium chloride per state or BLM COAs, or at the request of a county or landowner. Watering of access roads (or the use of chemical dust suppressants) in the project area during periods of heavy vehicle traffic vehicle could reduce fugitive dust (PM_{10}) by 50% or more, BLM 2003. As wells time out and are plugged and abandoned, roads constructed for the project would be reclaimed where requested by the BLM or surface landowner. Where a road requested for closure by the BLM or surface landowner served as an access route for isolated parcels of public land or served other public access needs, adverse effects on transportation and access could occur.

4.12.2. Cumulative Effects

Cumulative transportation and access impacts were assessed for the primary access routes for the project area. Section 3 discusses the current traffic conditions and planned roadway improvements along the primary access roads serving the project area. Cumulative impacts to transportation resources from the proposed action were assessed based on the transportation-related impact analysis in the PRB FEIS, which assumed that a significant traffic volume impact would occur if project-related (oil and gas development) vehicle trips generate a 25% or more increase in the annual average daily traffic (AADT) count compared with the existing (background) average daily traffic counts, p. 4-300. For all alternatives analyzed in the PRB FEIS, state and local roads serving as access corridors for oil and gas development within the PRB, especially Johnson and Campbell Counties, were anticipated to experience significant increases in vehicular traffic (above the 25% threshold), pp. 4-301 to 4-302. BLM anticipated traffic congestion occurring along Interstate 25, I-90, and State Highway 59, where vehicles and construction equipment would enter and exit oil and gas development areas, PRB FEIS, p. 4-354.

The anticipated drilling and completion schedule, Table , and the vehicle traffic estimates for a typical well under the proposed action, Table 2-6, were used to estimate increases in AADT attributable to project-related vehicles. Wells were assumed to be drilled and completed at a rate of 18 wells per year, although the actual drilling rates could range between 12 and 18 wells per year. Table summarizes the expected traffic impacts from the proposed action. Annual average daily traffic (AADT) would increase by approximately 281 additional vehicle trips during the second year of the project, which is expected to be the peak activity year due to ongoing traffic from the production of existing wells combined with traffic for the drilling and completion of additional wells. The largest increase in traffic would occur during well completion activities, corresponding with the high volume of hydraulic fracturing fluids and flowback/produced water being transported to and from the site. During the third year of production, when operations are anticipated to shift entirely to production and operation activities, AADT is expected to decrease to 142 additional vehicle trips, and remain relatively steady over the life of the project until production begins to decline. Additional traffic volume would be distributed over the major access routes serving the project area. The estimated increase in the risk of traffic accidents is expected to be proportional to the increase in AADT from project-related trips over baseline conditions. Although the specific locations of the proposed wells and access roads yet undefined, WY 50, an important regional corridor, is expected to serve as a primary access route to the project area.

Assuming that 75% of all vehicles trips to the project area would occur on WY 50 (between Interstate 90 to Black and Yellow Road), project-related trips during the peak activity year of the project would account for an approximate 9% increase in AADT above 2003 baseline conditions, then decrease to 4% above baseline conditions for the duration of production. Estimates of cumulative increase in traffic volume, which combine trips related to the proposed action with an additional 11% increase in AADT that occurred on WY 50 between 2003 and 2010, would peak at 19% during the second year of the project, then decrease to 15% above 2003 conditions for the duration of the project. These estimated increases in AADT on WY 50 are below the 25% significance threshold for project-related trips specified in the PRB FEIS, and are conservative in that they assume that all traffic increases since 2003 are related to oil and gas development. Additionally, actual vehicle trips may be considerably lower than these estimates based on actual rate of well drilling and completion and the distribution of traffic on roadways servicing the project area. In particular, water for use in hydraulic fracturing would likely come from a load out location in the Table Mountain area and would therefore not require use of WY 50 to enter the project area (removing approximately 50 trips/well per day during completion activities).

Additional increases in traffic volume that may occur in the vicinity of the project area, but are not quantified in this analysis include:

- activity associated with recently permitted wells in or next to the project area;
- activity associated with any additional new oil and gas developments proposed by any operators adjacent to the project area; and,
- the planned development of the Nichols Ranch Uranium In-Situ Recovery Project by Uranerz Energy Corporation south of the project area in Township 43 North, Ranges 75 and 76 West, and Township 44 North, Range 75 West.

Table 4-3. Traffic Impact Analysis

Phase of Development	**Total Vehicle Trips by Project Year[1] (Number of Completed Wells)[2]**		
	1st (18)	**2nd (36)**	**Duration of production (36)**
Pre-Construction Activities	5,760	5,760	0
Drilling Activities	20,016	20,016	0
Completion Activities	32,004	32,004	0
Production and Operation Activities[3]	18,936	44,856	51,840
Total Trips per Well per Year[4]	**4,262**	**2,851**	**1,440**
Total Trips per Project Area per Year	**76,716**	**102,636**	**51,840**
Increase in AADT Over Project Area	**210**	**281**	**142**
Percent Increase in AADT on WY 50 (from proposed action only)	**7%**	**9%**	**4%**
Cumulative Percent Increase in AADT on WY 50 (from proposed action and background traffic)[5]	**17%**	**19%**	**15%[2]**

Source: ICF 2012

[1] Vehicle trips were estimated using the information presented in Table 2-6.

[2] The 36 proposed wells were assumed to be drilled and completed at a rate of 18 wells per year, the maximum anticipated rate of development for the proposed action.

[3] Based on the anticipated drilling and completion sequence and timing presented in Table , production and operation activities were assumed to begin 97 days after pre-construction activities commence and continue at a rate of 4 trips per day for the life of the well.

[4] BLM estimated annual vehicle trips by multiplying WYDOT average annual daily traffic (AADT) from 2003 by 365 days.

[5] Estimated AADT increases are based on 2003 conditions to allow for comparison with the significance threshold (25 percent increase in AADT) established in the PRB FEIS. Cumulative traffic estimates include an approximate 11 percent increase in AADT on WY 50 from 2003 to 2010.

[6] Because predicting future trends in traffic volume on WY 50 unrelated to the proposed action was is beyond the scope of this analysis, all traffic not related to the proposed action was assumed to remain at 2010 levels over the life of the project.

4.12.3. Mitigation Measures

BLM will analyze the site-specific proposal, its design features, and its operator committed measures. BLM, with the operator as much as possible, will determine which if any of the programmatic mitigation measures to apply from the PRB FEIS ROD, from this EA's Appendix D, or whether to consider the application of other mitigation measures supported by further specific analysis.

4.12.4. Residual Effects

Some transportation and access effects may persist beyond the life of the project including vehicle trips associated with the reclamation of well pads and roads, as well as any disturbances created from access roads constructed in association with the proposed action that may be repurposed for future mineral development activities or other uses.

4.13. Range Management

4.13.1. Direct and Indirect Effects

Construction of the individual well pads, access roads, pipelines, etc., would result in an minor reduction in livestock and wildlife forage and a subsequent reduction in the available animal unit months (AUMs) in each affected grazing allotment. For the purpose of assessing impacts to range resources, BLM converted acres of disturbance to a reduction in AUMs based upon an average of 6 acres/AUM for the project (BLM 2010b). Initial surface disturbances associated with the proposal would result in a maximum reduction of 105 AUMs in the project area; however, actual reductions are likely to be lower and will depend on the siting of wells and infrastructure in relation to grazing allotment boundaries. Design features of the project that would further reduce impacts to grazing allotments include: 1) use of existing disturbance; 2) seeding and stabilization of disturbed areas; 3) monitoring for invasive/noxious weeds and applying weed control techniques to manage infestations; and 4) fencing all open pits in accordance with management direction received from both the authorized officer and/or the affected private surface owner. Reclamation of those areas not required for ongoing production and operations would place approximately 80 AUMs back into forage, with continuing disturbance on 150 acres (25 AUMs) through the life of the project, which represents 2% of the total average AUMs available on surface lands in the project area.

The disturbance of existing, native vegetation would create opportunities for the establishment of invasive, non-native (invasive) species, thereby reducing the available AUMs in the affected areas. Invasive species are easily established and commonly found on all newly disturbed and reclaimed sites throughout Wyoming. These species are fast growing, can out-compete native species, can increase the danger of wildfires, and can prevent the establishment of native species including grasses, forbs and, and shrubs. However, initial surface disturbances associated with the proposed project area would affect at most, 3% of the surface acreage in grazing allotments in the overall project area. Successful interim reclamation of the initial surface disturbance associated with the proposed action would further reduce the areas potentially subject to invasion by non-native and noxious weed species.

4.13.2. Cumulative Effects

Long-term, cumulative adverse impacts to grazing allotments in the project area would likely decrease over the life of the proposed action as existing CBNG wells in the project area are plugged and abandoned. As these CBNG wells time out, and because of the ability of a single horizontal well to extract oil and gas from an area that would normally require multiple vertical wells, the amount of overall surface disturbance in the project area would likely decrease. This decline could increase available forage for grazing animals. The successful reclamation of 233 existing CBNG wells expected to time out over the life of the CCE proposal would result in approximately 47 fewer acres of disturbance. Further reductions in overall disturbance would take place through the reclamation of any associated roads, facilities, and other infrastructure no longer needed after well abandonment. However, effects from any additional new CCE-area development could further reduce available forage. See Section 2 for illustrations of the anticipated long-term versus short-term facilities in the project area.

4.13.3. Mitigation Measures

BLM will analyze the site-specific proposal, its design features, and its operator committed measures. BLM, with the operator as much as possible, will determine which if any of the programmatic mitigation measures to apply from the PRB FEIS ROD, from this EA's Appendix D, or whether to consider the application of other mitigation measures supported by further specific analysis.

4.13.4. Residual Effects

Some effects to livestock grazing and range management may persist beyond the life of the project. If requested and agreed to by APC and the surface land owner, some well access roads could remain. In addition, in areas of limited reclamation potential or other areas where restoration of vegetation communities is difficult, reclaimed disturbance may take additional time to accomplish and could reduce available forage in a portion of the project area following project completion.

4.14. Social and Economic

4.14.1. Direct and Indirect Effects

Projecting the direct and indirect socio-economic effects from the CCE's proposed 36 oil and gas wells is inexact, at best. Production results depend in large part on unknown or closely held variables not limited to: thickness of the target formation at the points of lateral interception; the recovery factor; the formation's rock permeability at lateral interception; the quality of the raw hydrocarbon; the oil to gas conversion ratios; crude oil to NGLs (natural gas liquids); finding and development costs; estimated ultimate reserves; and other factors. It may be easier to forecast project costs to yield an approximation of an estimated socio-economic effect. Operator costs for drilling 1 horizontal well also vary by factors that are not limited to depth; formation; water and proppant availability; etc. Drilling costs range from $7.5 to $10 million per well. CCE's 36+/- wells yield a drilling cost from $270 to $360 million. One-quarter to on-third of a billion dollars of economic activity in sparsely populated Johnson and Campbell Counties, and in Wyoming will yield a positive socio-economic effect for local communities, their schools, tax bases, and flow-through economics in local and regional businesses.

BLM anticipates the direct and indirect effects of implementing Alternative B are similar are minimally impacted with the positive effects of production while supporting timing limitations for Greater Sage-Grouse or migratory birds. A seasonal timing restriction is consistent with the lease rights granted, in that the reasonable and prudent reduction in the potential for "take" under the MBTA from operations on this lease are consistent with the lease terms and conditions, and applicable BLM regulations (see 43 CFR 3101.1-2: "A lessee shall have the right to use so much of the leased lands as is necessary to explore for, drill for, mine, extract, remove and dispose of all the leased resource in a leasehold subject to:… restrictions deriving from specific, nondiscretionary statutes…"). The prohibition of the "take" of an MBTA-protected species is provided in the MTBA, a "specific, nondiscretionary statute" and from which the BLM derived the proposed programmatic mitigation measure (programmatic COA) (in consultation with the FWS). There will be no loss in revenue stream to the operator and no reduction in royalties to the federal government and the State of Wyoming.

There may be a minor increase an operator's cost from additional surveys, modification of equipment, or design needs in order to ensure compliance with the Greater Sage-Grouse or migratory bird programmatic mitigation measure. Also, it is possible that there may be a delay in project's construction. Construction may be delayed by approximately 1 month past Greater Sage-Grouse timing limitations, if surveys are incomplete or an active nest is found. A 1 month delay should not substantially impact operators, as the Buffalo BLM routinely imposes a timing limitation of similar length for active raptor nests (February 1 – July 31). The authorized officer can require reasonable measures to minimize impacts to other resources, including timing of operations (43 CFR 3101.1-2). The recommended timing limitation is not more stringent in length, or different in nature, than those which are currently included in the RMP and routinely applied to permits for bald eagles, raptors, mountain plover, or Greater Sage-Grouse.

The proposal should have little to no impact to surface or ground water provided operators and the BLM practice and enforce best management practices regarding drilling, cementing, completion, and disposal. The proposal will have a minor adverse impact on vehicle traffic, but in sparsely populated Wyoming this impact effect will be a local effect. This traffic effect on local people and the wear on their roads should be offset by the revenues the proposal should generate - so that, if local officials authorize, may pay for road upgrades or maintenance. A minor adverse sociological effect may occur if large numbers of men, in lieu of families, temporarily live in some small, rural towns. This documented phenomena in other locations sometimes contributed to a minor increase in crime or substance abuse.

4.14.2. Cumulative Effects

The cumulative effects include the potential for long-term revenue increases for the federal, state, and local governments through increases to the tax bases and increases generated through the economic activity to produce and operate these proposed wells, see Section 3, Social and Economic. These cumulative effects will include the economic flow-through to incremental increases in housing and other community services.

4.14.3. Mitigation Measures

BLM addressed, above, the mitigation measures to minimize the social and economic effects from the small potential of air, water, or soil degradation. Similarly BLM addressed the small adverse effects from temporary increases in traffic. The programmatic mitigation from both the PRB FEIS ROD and this EA should minimize other potential adverse social and economic effects from this proposal.

4.14.4. Residual Effects

BLM estimates the residual social and economic effects from this proposal should strengthen communities and economies – particularly at county and state level – through increasing opportunities for employment, community economic activity, and tax revenues.

5. CONSULTATION/COORDINATION

BLM consulted or coordinated with the following on this project:

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